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SELECTED WATER RESOURCES ABSTRACTS

VOLUME 6, NUMBER 1
JANUARY 1, 1973

W73-00001 - W73-00650

SELECTED WATER RESOURCES ABSTRACTS is published semimonthly for the Water Resources Scientific Information Center (WRSIC) by the National Technical Information Service (NTIS), U.S. Department of Commerce. NTIS was established September 2, 1970, as a new primary operating unit under the Assistant Secretary of Commerce for Science and Technology to improve public access to the many products and services of the Department. Information services for Federal scientific and technical report literature previously provided by the Clearinghouse for Federal Scientific and Technical Information are now provided by NTIS.

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SELECTED
WATER RESOURCES ABSTRACTS

A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Resources Research, U.S. Department of the Interior

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Use of funds for printing this publication approved by the Director of the Bureau of the Budget, September 4, 1968.

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Resources Research and other Federal water resources agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Resources Research
U.S. Department of the Interior
Washington, D. C. 20240

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01 NATURE OF WATER
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02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
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ABSTRACT SOURCES

02. WATER CYCLE

2A. General

A THREE-DIMENSIONAL MODEL TO COMPUTE LAND SUBSIDENCE,
Centro di Ricerca IBM di Venezia (Italy).
For primary bibliographic entry see Field 02F.
W73-00026

DESIGN OF ANALOG MODEL FOR AQUIFER RESPONSE STUDIES, USING A DIGITAL MODEL,
Waterloo Univ. (Ontario).
For primary bibliographic entry see Field 02F.
W73-00131

KINEMATIC WAVE NOMOGRAPH FOR TIMES OF CONCENTRATION,
Maryland Univ., College Park. Dept. of Civil Engineering.
R. M. Ragan, and J. O. Duru.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY10, Paper 9275, p 1765-1771, October 1972. 4 fig, 10 ref, append.

Descriptors: *Hydrograph analysis, *Overland flow, *Peak discharge, *Flood forecasting, *Rainfall-runoff relationships, Rational formula, Waves (Water), Time of concentration, Hydraulic models, Mathematical models.
Identifiers: *Kinematic wave theory, *Nomographs.

The kinematic wave model provides a good approximation to the rising side of the overland flow hydrograph in most cases that are of interest in flood hydrology. A nomograph based on the kinematic wave formulation is proposed as a design aid for determining the time of concentration for overland flow. Results obtained with the kinematic wave model compare favorably with those obtained experimentally. (Knapp-USGS)
W73-00137

FLOODS PREDICTED FROM RAINFALL FREQUENCIES,
Idaho State Univ., Pocatello.
L. Robinson, and T. T. Williams.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY10, Paper 9294, p 1773-1787, October 1972. 5 fig, 3 tab, 10 ref, append.

Descriptors: *Flood forecasting, *Flood frequency, *Flood data, Peak discharge, Flood recurrence interval, Rainfall-runoff relationships, *Montana, Frequency analysis, Statistics, Statistical methods, Probability.

Short streamflow records often make predicting the frequency of floods on small watersheds difficult. As peak-flow rates are related to rainfall, at least in part, a logical approach in predicting floods is to utilize long rainfall records which are often available. Using this approach, a method was developed to predict floods on small Montana watersheds. The method uses mean annual flood, determined from short streamflow records, and three factors relating the frequency distribution of rainfall intensities to the frequency distribution of peak annual flows. An example shows how the method can be applied. (Knapp-USGS)
W73-00138

A BASIN STUDY OF GROUND-WATER DISCHARGE FROM BEDROCK INTO GLACIAL DRIFT, PART II--ESTIMATE OF DISCHARGE,
Oklahoma State Univ., Stillwater.
For primary bibliographic entry see Field 02F.
W73-00187

INTERNATIONAL COOPERATIVE STUDIES IN HYDROLOGY AND PROSPECTS OF DEVELOPMENT OF HYDROLOGY AS A SCIENCE (MEZHDUNARODNOYE SOTRUDNICHESTVO V OBLASTI GIDROLOGICHESKIKH ISSLEDOVANIY I PERSPEKTIVY RAZVITIYA GIDROLOGII KAK NAUKI),
Z. Mikulski.
Akademiya Nauk SSSR Izvestiya, Seriya Geograficheskaya, No 5, p 151-158, September-October 1971. 10 ref.

Descriptors: *Hydrology, *International Hydrological Decade, *Data collections, Conferences, Organizations, United Nations, Water resources, Water balance, Hydrologic cycle, Hydrogeology, Instrumentation, Forecasting, Theoretical analysis, Geophysics, History.
Identifiers: *USSR, *International organizations, United Nations Educational, Scientific, and Cultural Organization, International Association of Scientific Hydrology, World Meteorological Organization, Food and Agricultural Organization, International Atomic Energy Agency, Hydrosphere.

International cooperation in hydrology after the framework of the International Hydrological Decade (IHD) is being promoted in three principal directions: (1) scientific hydrology, concerned with data interpretation to derive water balances and hydrologic regimes; (2) operational hydrology, devoted to basic-data collection and analysis; and (3) applied (technical) hydrology, emphasizing the practical applications of hydrologic knowledge. As an interdisciplinary science, hydrology relates to geohydrology, anthropogenic hydrology, forecast hydrology, instrumental hydrology, and theoretical hydrology. Prospects of development of hydrology as a geophysical discipline are discussed in terms of the importance of geophysics in investigations of the hydrosphere. (Josefson-USGS)
W73-00194

HYDROLOGIC EFFECTS OF URBANIZATION IN THE UNITED STATES,
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 03D.
W73-00261

2B. Precipitation

VARIABILITY OF SEASONAL AND ANNUAL RUNOFF IN NORWAY,
International Hydrological Decade, Oslo (Norway). Norwegian National Committee.
For primary bibliographic entry see Field 02E.
W73-00014

PRECIPITATION MEASUREMENTS WITH VARIOUS PRECIPITATION GAUGE INSTALLATIONS,
Lantbrukhogskolan, Uppsala (Sweden). Institutionen for Lantbrukets Hydroteknik.
J. Sandsborg.
Nordic Hydrology, Vol 3, No 2, p 80-106, 1972. 13 fig, 8 tab, 43 ref.

Descriptors: *Rain gages, *Precipitation gages, *Calibrations, *Instrumentation, Variability, Statistics, Measurement, Gaging stations.
Identifiers: *Sweden.

Precipitation measurements taken with various precipitation gage installations at Ultuna, Sweden were compared. A new gage constructed to measure small spatial variations in rainfall was tested. The difficulty in measuring both rain and snow with the same elevated gauge is discussed. An extrapolation procedure was used in an attempt to estimate the snowfall at the snow surface. The great loss in the catch of snow when using elevated gauges (40-50% at 1.5 m over the ground surface) indicates that this method is very unsatisfactory for measuring solid precipitation. The use of gages with diameters smaller than 10 cm placed at fixed heights above the ground may contribute to an increased variation in the measured precipitation values. Wind conditions may have a very great effect on the catch of precipitation by elevated gages. Error can be considerably diminished by placing the gages with their orifices level with the ground or in the surface of the vegetation. A means is given to estimate the loss in measured rainfall at a fixed height above the ground by use of a relation between wind speed and rainfall intensity. For example, if the weighted average wind speed is 6 m per sec. and the corresponding weighted average intensity 2 mm per hour, then the deficiency in rainfall may be roughly estimated to be 8%. (Knapp-USGS)
W73-00015

A METHODOLOGY FOR THE SYNTHESIS OF SPATIALLY-DISTRIBUTED SHORT-TIME-INCREMENT STORM SEQUENCES,
Universidade Tecnica de Lisboa (Portugal); and Lancaster Univ., Bailrigg (England).
J. C. Wilkinson, and L. Valadares Tavares.
Journal of Hydrology, Vol 16, No 4, p 307-315, August 1972. 1 fig, 1 tab, 6 ref.

Descriptors: *Synthetic hydrology, *Storms, *Distribution patterns, *Hydrographs, Hydrograph analysis, Simulation analysis, Mathematical models, Time series analysis, Depth-area-duration analysis, Rainfall-runoff relationships, Mass curves.
Identifiers: Storm sequence simulation.

A method is proposed for generating synthetic storm sequences. It differs from most previous methods in that a storm is described by hydrographs at more than one point and hence is spatially distributed. In addition instead of using a sequential generation procedure with fixed time increments the storm duration is itself used as a random variable, with the hydrograph shapes being generated subsequently. (Knapp-USGS)
W73-00019

SOME APPLICATIONS OF REMOTE SENSING IN ATMOSPHERIC MONITORING PROGRAMS,
Newcastle County Dept. of Natural Resources and Environmental Control, Dover, Del.
For primary bibliographic entry see Field 05B.
W73-00104

PROJECT FOG DROPS, PART II: LABORATORY INVESTIGATIONS,
Cornell Aeronautical Lab., Inc., Buffalo, N.Y.
W. C. Kocmond, E. J. Mack, U. Katz, and R. J. Pilie.
Available from NTIS, Springfield, Va as NASA CR-2079, Price $3.00 paper copy; $0.95 microfiche. Geological Survey-National Aeronautics and Space Administration Contractor Report NASA CR-2079, 1972. 36 p, 13 fig, 14 ref. NASW-2126.

Descriptors: *Fogs, *Weather modofication, *Light, *Laboratory tests, Atmosphere, Analytical techniques, Condensation, Drops (Fluids), Mucleation, Pollutants, Particle size, Cloud physics, Evaluation.
Identifiers: *Fog dissipation, *Photochemical reactions, Fog properties.

Photochemical reactions were produced in a 600 cubic meter cloud chamber by irradiating the

chamber air with a 5000 watt Hg arc source. Measurements of the total nucleus concentration and cloud condensation nuclei (CCN) were acquired for several conditions representing both high normal and severe pollution levels for the Los Angeles Basin as well as clear filtered air. The data show that in filtered air (free of particles) there is a large photochemically induced increase in the total particle content within a few minutes after starting the lamp. The concentration of CCN, however, remains near zero, until sufficient coagulation and condensation occurs on the smaller Aitken particles. The addition of gaseous pollutants to filtered air results in large increases in the photochemical production of both the cloud and Aitken nucleus concentration. When unfiltered noonday country air containing appreciable numbers of nuclei was introduced into the chamber and exposed to the Hg arc sources, no increase in particle concentration was observed. In a series of separate laboratory experiments, fogs were generated under controlled, reproducible conditions in the cloud chamber and seeded with aerosols of various compounds which form monomolecular surface films at air-water interfaces. Visibility characteristics and droplet data were obtained for both seeded and control fogs. (Woodard-USGS)
W73-00123

CLOUD CHAMBER STUDY OF WATER EVAPORATION,
New Mexico State Univ., University Park. Water Resources Research Inst.
For primary bibliographic entry see Field 02D.
W73-00266

THE MINIMUM PROBABLE RAINFALL IN MYSORE STATE DURING THE CROP-GROWING SEASON,
University of Agricultural Sciences, Bangalore (India). Dept. of Physics.
B. V. Ramana Rao, and E. V. Murali Mohana Rao.
Mysore J Agric Sci. Vol 5, No 3: p 272-282. 1971. Illus.
Identifiers: Crops, *India, Mysore, *Rainfall, Season.

The monthly rainfall data of 45 selected stations spread all over Mysore State for the months of June to Oct. were tested for normality. Suitable transformations were applied whenever the data were found to be skewed and the amount of rainfall with 75% probability was estimated. Constant rainfall probability maps were drawn for the months considered and the important features observed on the maps are discussed. Generally the amount of rainfall a farmer can expect, with 75% reliability was far below the requirement of crops under rainfed conditions in all parts of the State except in the Malnad and Semi-Malnad regions.--Copyright 1972, Biological Abstracts, Inc.
W73-00642

2C. Snow, Ice, and Frost

CHEMISTRY OF POLAR SNOWS. ESTIMATION OF RATES OF DEPOSITION IN ANTARCTICA,
Centre National de la Recherche Scientifique, Grenoble (France). Laboratoire de Glaciologie.
For primary bibliographic entry see Field 02K.
W73-00122

OASES OF EAST ANTARCTICA (OAZISY VOSTOCHNOY ANTARKTIDY),
Arkticheskii i Antarkticheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
I. M. Simonov.
Gidrometeoizdat, Leningrad, 1971. 176 p.

Descriptors: *Antarctic, *Exploration, *Investigations, *Glaciology, Glaciers, Glacial drift, Snow, Ice, Sea water, Lakes, Soils, Rocks, Sediments, Vegetation, Wildlife, Geomorphology, Topography, Meteorology, Climatology, Weathering.
Identifiers: *USSR, *Oases, Fluvioglacial, Thermokarst, Nivation, Paleogeography, Tectonics, Wind roses.

The Shirmakher and Molodezhnyy oases in East Antarctica were investigated in 1962-63 by the Seventh Soviet Antarctic Expedition and in 1965-66 by the Tenth Soviet Antarctic Expedition. Attention is focused on the topography, climate, lakes, soils, vegetation, and fauna of the oases. A division of Antarctic oases into classes and types on the basis of topographic features is examined. (Josefson-USGS)
W73-00196

SETTLEMENT OF PIPELINE ON THAWING PERMAFROST,
Cambridge Univ. (England). Dept. of Engineering.
For primary bibliographic entry see Field 08A.
W73-00201

REDUCING ICE FORMATION AT NAVIGATION DAMS,
Army Engineer District, St. Paul, Minn.
For primary bibliographic entry see Field 08B.
W73-00202

PHYSICAL PROPERTIES OF THE SNOW COVER IN THE FT. GREELY AREA, ALASKA,
Cold Regions Research and Engineering Lab., Hanover, N.H.
C. S. Benson.
Army Cold Regions Research and Engineering Laboratory Special Report 178, August 1972. 24 p, 30 fig, 11 ref.

Descriptors: *Snowpacks, *Alaska, *Snow cover, *Cryology, Snow, Snow surveys, Crystallization, Cold regions.
Identifiers: *Snow physical properties, *Ft. Greely (Alaska).

The snow cover of the Ft. Greely area of Alaska is variable both in depth and structure. In general it consists of grains of ice about 1 mm in diameter with relatively low bearing capacity and strength. Two extreme cases are quite common in the Ft. Greely area: (1) depth hoar layers consisting of coarse (up to 1 or 2 cm in length) skeletal crystals with negligible cohesion between them, and (2) wind-packed, fine-grained snow (grains of less than 1mm diameter) in hard, well bonded, strong layers. The wind-packed layers often occur in 10- to 20-cm-thick slabs and are underlain by depth hoar layers which give poor support to the overlying slab. In addition to the wind slabs, an important feature of the snow cover of interior Alaska is its low density. The best examples of this in the Ft. Greely area are from the Forest, Davy Crockett and NBC sites. Throughout interior Alaska there are many places where almost the entire snowpack, 50 to 70 cm thick, consists of depth hoar with density less than 0.20 g per cc just before melting begins. These represent 'final' density values for the depth hoar, because it has been developing in the snowpack for 6 to 8 months. The effect of snow structure on vehicle traffic is extremely variable from place to place. This is documented by measurements of density, temperature, and ram hardness together with 21 photographs and 9 line drawings. (Knapp-USGS)
W73-00204

CONTRIBUTION BY SNOW TO THE NUTRIENT BUDGET OF SOME SMALL NORTHWEST ONTARIO LAKES,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 05C.
W73-00250

FROST HEAVING OF PILES IN PERMAFROST,
Wyller-Kollewich-Van Doren and Hazard, Anchorage, Alaska; and Raymond International, Inc., Anchorage, Alaska.
For primary bibliographic entry see Field 08D.
W73-00323

THE WORLD OF UNDERGROUND ICE,
British Columbia Univ., Vancouver. Dept. of Geography.
J. R. Mackay.
Annals of the Association of American Geographers, Vol 62, No 1, p 1-22, March 1972. 24 fig.

Descriptors: *Permafrost, *Arctic, *Frozen ground, Ice, Cryology, Soil water movement, Groundwater movement, Canada, Frozen soils, Cold regions, Soil mechanics, Tundra.
Identifiers: *Pingos.

Underground ice is restricted to permafrost areas where its distribution is sporadic and often unpredictable. A variety of man-induced disturbances can cause underground ice to thaw, often with serious consequences. The criteria for a classification of the principal types of underground ice are the sources of the water prior to freezing and the processes which transfer water to the freezing plane. The origin of massive icy bodies in the Western Arctic of North America may be explained by a water-expulsion theory. The excess water now found in the icy bodies is attributed to water expelled from coarse-textured sediments by the downward growth of permafrost. The mechanism is illustrated by three pingos which have grown since 1950. The role of glaciation in the formation of relic offshore permafrost in relatively shallow Arctic coastal areas is examined. Offshore permafrost is present in some shallower portions of the Beaufort Sea from northeastern Alaska eastwards to the high Arctic islands of Canada. If offshore permafrost with underground ice is present, then thermal disturbance problems must be taken into consideration in future offshore exploration. (Knapp-USGS)
W73-00592

POLAR ICE SHEETS: A REVIEW,
Scott Polar Research Inst., Cambridge (England).
G. de Q. Robin.
Polar Record, Vol 16, No 100, p 5-22, January 1972. 12 fig, 10 ref.

Descriptors: *Glaciation, *Antarctic, *Glaciers, Regimen, Flow, Topography, Remote sensing, Boreholes, Glaciology, Water balance.
Identifiers: *Greenland, *Antarctica.

A review of Glaciers and other large ice masses was written for the layman with little background knowledge, but who wishes to learn more about the ice sheets covering Greenland and Antarctica. At the present time, only Antarctica and Greenland carry ice sheets comparable with the ice sheets that covered vast areas of the Northern Hemisphere as recently as 20,000 years ago. At the time of maximum glaciation, some 300,000 years ago, the volume of ice on earth was three times what it is today, and it covered the northern parts of continents all around the Artic Ocean. Evidence from recent studies leads to the conclusion that the dimensions and movement of these ice sheets are close to being in balance with their present climatic environment. (Knapp-USGS)
W73-00595

THE VEGETATIONAL RELATIONS OF WEATHERING, FROST ACTION, AND PATTERNED GROUND PROCESSES, IN THE MESTERS VIG DISTRICT NORTHEAST GREENLAND,
H. M. Raup.
Medd Gronland. Vol 194, No 1, p 7-92. 1971. Illus.
Identifiers: *Frost, *Greenland, *Mesters Vig region, Species, Tolerance, *Vegetation, *Weathering.

Botanical descriptions and analyses presented apply to representative sites selected from those discussed by Washburn in 'Weathering, frost action, and patterned ground in the Mesters Vig district, Northeast Greenland.' They deal with vegetation-site relations in the following habitat complexes: rocky hilltops, ledges, crevices and talus; simple and compound nonsorted circles and their included small nonsorted polygons; small sorted and nonsorted polygons on emerged delta remnants; large nonsorted polygons; debris islands; and large sorted nets. Site factors used are: coverage of the ground by vascular plants; moisture supply; and physical disturbance of the soil by frost- and nonfrost-induced geomorphic processes. The vegetations are analyzed with respect to their species' tolerance of variation and intensity in the factor gradients. A summary compares the sites in terms of the relative proportions of wide, intermediate and narrow tolerance shown by their vascular floras on each of the gradients. The analyses presented show, as did those made for the mass-wasting sites, positive correlations between the local distribution of species tolerance and the local behavior of the site factors of coverage, moisture and physical disturbance. They suggest further that the ratings of species tolerance made from general observations are sufficiently valid to be useful as indicators of these site conditions.--Copyright 1972, Biological Abstracts, Inc.
W73-00630

SNOW-COVER PROBLEMS NEAR THE ARCTIC TREE-LINE OF NORTH AMERICA,
Toronto Univ. (Ontario). Dept. of Geography.
F. Hare.
Ann Univ Turku Ser A II Biol Geogr. 47. p 31-40. 1971. Illus.
Identifiers: *Arctic, *North America, Runoff, *Snow cover, Tree line.

The snow-cover of late winter near the Arctic treeline shows marked differences in density and depths according to local site and vegetation. There are also acute uncertainties in the measurement of fresh snow. Recent research in Labrador-Ungava suggests that snow, and hence total precipitation, tends to be undermeasured by standard climatological techniques. Run-off measurements confirm this suggestion. It is concluded that careful snow-survey techniques, properly adapted to vegetation cover, are necessary to give good regional estimates of water balance parameters; and that net water availability within the southern tundra and northern boreal forest communities probably exceeds present published estimates.--Copyright 1972, Biological Abstracts, Inc.
W73-00641

2D. Evaporation and Transpiration

SOME EXAMPLES OF APPLYING THE MEASUREMENT OF RADIATION TO THE DETERMINATION OF EVAPOTRANSPIRATION IN A TROPICAL CLIMATE, (QUELQUES EXEMPLES D'APPLICATION DES MESURES DE RAYONNEMENT A LA DETERMINATION DE L'EVAPOTRANSPIRATION EN CLIMAT TROPI CAL),
Ch. Riou.
International Association of Hydrological Sciences Bulletin Vol 17, No 2, July 1972. p 189-208, 7 fig, 3 tab, 17 ref.

Descriptors: *Evapotranspiration, *Solar radiation, *Mathematical models, Data collections, Energy budget, Evaporation, Africa.
Identifiers: Chad, Central African Republic, Congo.

From data obtained at stations in Chad, the Central African Republic, and Congo-Brazzaville, stretching from the desert to the equatorial zone, it is possible to compare measurements of evapotranspiration and of evaporation with results obtained by using the energy-balance method. Several difficulties arise in these comparisons since the scale of the measurements (small evaporating surfaces) is generally different from that of the climatic characteristics on which evaporation is dependent. A model is proposed to resolve this problem, using the empirical coefficients of Penman's formula. The potential evapotranspiration calculated in this way is in good agreement with water balance data. At these stations the evapotranspiration energy may be a constant percentage of global short-wave radiation. The energy-balance method was used at Brazzaville to measure the actual evapotranspiration over grass during the dry season. Actual and potential evapotranspiration were found to be closely related. (Knapp-USGS)
W73-00188

TRANSPIRATION-LINKED SHOT-CIRCUIT CURRENTS IN THE XYLEM OF A LIANA,
Australian National Univ., Canberra. Research School of Biological Sciences.
G. D. Farquhar, and C. D. Field.
J Exp Bot. Vol 22, No 73, p 818-829. 1971. Illus.
Identifiers: Cayratia-Clematidea-D, Currents, Electricity, *Liana, Sap, *Transpiration, *Xylem.

An application of the methods of irreversible thermodynamics to the fluxes in plant xylem is examined, and an expression is derived for the electric current present when a length of stem is short circuited. After examination of the electrode bypassing efficiency, bioelectricity in Cayratia clematidea (F. Muell.) Domin., maintained under conditions of adequate soil water, is shown to reflect changes in the transpiration rate. Pressure gradients and sap velocities in C. clematidea are estimated from short-circuit current data. The experimental technique described may be useful for continuous measurements of sap flow or transpiration without disturbing the plant environment.--Copyright 1972, Biological Abstracts, Inc.
W73-00226

CLOUD CHAMBER STUDY OF WATER EVAPORATION,
New Mexico State Univ., University Park. Water Resources Research Inst.
W. B. Good.
Available from the National Technical Information Service as PB-212 584, $3.00 in paper copy, $0.95 in microfiche. New Mexico Water Resources Research Institute, Las Cruces, Report 009, 1972. 52 p, 12 fig, 18 ref, append. OWRR A-024-NMEX (3).

Descriptors: *Cloud physics, *Evaporation, *Drops (Fluids), *Surface tension, *Clouds, *Salts, *Supersaturation, Condensation, Diffusion, Evaporation control, Evaporation pans, Vapor pressure, Water properties, Monomolecular films, Instrumentation, Equilibrium, Heat, Physics, Temperature, Air, Atmosphere, Fog, Nucleation, Water vapor, Analytical techniques, Calibrations, Equipment, Electromagnetic waves.
Identifiers: *Expansion cloud chamber, *Cloud chamber design, *Alcohol monolayers, *Cloud density, Atmospheric structure, Cloud formation, Air-liquid interface, Temperature gradients, Inert atmospheres, Dodecanol.

A cloud chamber system was developed to study the evaporation of water and a series of experiments performed to demonstrate its ability to carry out such investigations. An analytic method was developed to interpret the results of the study and a relationship between evaporation resistance and water surface tension established. The effect on evaporation of long-chain alcohol monolayers was examined and Tetra, Hexa, and Octadecanol alcohols found to be better inhibitors than Dodecanol. Two particularly important applications of the cloud chamber system developed: the study of the effect of dissolved contaminants on evaporation resistance of water and the effect of surface barriers on the evaporation rate. NaCl inhibits evaporation strongly with the resistance to evaporation increasing with the concentration of salt in solution. CaCl apparently reduced the resistance to evaporation. The development of a cloud within the chamber as a function of chamber atmosphere temperature gradient showed a fog-like behavior for gradients greater than 1 degree C/cm. For smaller gradients the cloud development was generally uniform throughout the chamber. Cloud development as a function of water temperature was observed and a variation in evaporation resistance noted. (Creel-New Mexico State)
W73-00266

2E. Streamflow and Runoff

RELATIONSHIP BETWEEN STREAM WATER TEMPERATURE AND AMBIENT AIR TEMPERATURE,
Laval Univ., Quebec.
For primary bibliographic entry see Field 05B.
W73-00013

VARIABILITY OF SEASONAL AND ANNUAL RUNOFF IN NORWAY,
International Hydrological Decade, Oslo (Norway). Norwegian National Committee.
A. Tollan.
Nordic Hydrology, Vol 3, No 2, p 72-79, 1972. 5 fig, 1 tab, 4 ref.

Descriptors: *Runoff, *Variability, *Rainfall-runoff relationships, *Synoptic analysis, Data collections, Hydrologic data, Statistics, Correlation analysis, Climatology, Meteorology.
Identifiers: *Norway.

A preliminary map of variability of annual runoff in Norway is based on estimates of the coefficient of variation for 56 non-regulated discharge stations having more than 35 years of continuous observations. The regional pattern reflects the altitude and possibly also the different precipitation regimes of Norway; low variability characterizes the wet western part of the country where frontal precipitation dominates, and relatively high variability typifies the drier South-Eastern Norway where considerable amounts of convective precipitation are common. Variability of annual runoff is slightly affected by catchment area. Variability of monthly runoff also shows a regional pattern which is interpreted in terms of runoff regime characteristics. (Knapp-USGS)
W73-00014

PREDICTION OF THE DIMENSIONLESS UNIT HYDROGRAPH,
Kentucky Univ., Lexington.
J. Lienhard.
Nordic Hydrology, Vol 3, No 2, p 107-109, 1972. 4 ref.

Descriptors: *Unit hydrographs, *Dimensional analysis, Hydrograph analysis, Statistics, Statistical methods, Reviews, Rainfall-runoff relationships.

Statistical mechanical predictions of the dimensionless unit hydrograph in which all constants are rationalized are reviewed. In a large class of hydrograph equations, merit lies in the fact that the constants used are not arbitrary. They are fixed by the shape of the watershed and by the moment that is assumed to be known for the watershed. (Knapp-USGS)
W73-00016

ESTIMATING THE T-YEAR FLOOD BY THE EXTENSION OF RECORDS OF PARTIAL DURATION SERIES,
Institute of Hydrology, Wallingford (England).
J. Frost, and R. T. Clarke.
International Association of Hydrological Sciences Bulletin Vol 17, July 1972. p 209-217, 1 tab, 9 ref.

Descriptors: *Flood forecasting, *Flood frequency, *Stochastic processes, *Flood recurrence interval, *Time series analysis, Monte Carlo method, Peak discharge, Probability, Duration curves, Depth-area-duration analysis, Distribution patterns, Synthetic hydrology.

The discharge likely to be exceeded once in T years on average is the 'T-year flood'. This may be estimated in at least three ways: by fitting a probability distribution to the record of annual maximum discharges, by Monte Carlo simulation using a time-series model of the instantaneous peak discharges in short time-intervals, or by a 'partial duration series' approach, in which a stochastic model is formulated for discharges exceeding a threshold. The stochastic method commonly assumes a Poisson distribution for the occurrence of exceedances and an exponential distribution for the magnitudes of exceedances. An extension of the partial duration series method may be used in the commonly-encountered situation in whic h (a) the T-year flood must be estimated for a gauging site with a short record, and (b) a longer record is available for a nearby gauging site. Such an extension is possible if the following assumptions are valid: (a) the incidence of exceedances follows a bivariate binomial distribution for the period of common records; (b) the magnitudes of exceedances follow a bivariate exponential distribution. (Knapp-USGS)
W73-00025

GENERALIZATION OF THE SEMI-EMPIRICAL THEORY OF TURBULENCE TO FLOWS NEAR ROUGH SURFACES WITH VARIOUS MODES OF ROUGHNESS,
For primary bibliographic entry see Field 08B.
W73-00030

TURBULENCE IN THE VISCOUS SUBLAYER NEAR A PLANE WALL,
For primary bibliographic entry see Field 08B.
W73-00031

PRESSURE FLUCTUATIONS AT THE BOUNDARY OF A TURBULENT FLOW,
For primary bibliographic entry see Field 08B.
W73-00032

THE FORMATION OF REGULAR COMPONENTS IN A RANDOM FIELD OF TURBULENT FLUCTUATIONS WITH UNSTEADY GROWTH OF THE BOUNDARY LAYER,
For primary bibliographic entry see Field 08B.
W73-00033

SOME CHARACTERISTICS OF A TURBULENT BOUNDARY LAYER WITH A POSITIVE PRESSURE GRADIENT AND INJECTION,
For primary bibliographic entry see Field 08B.
W73-00034

SOME QUESTIONS ON THE EFFECT OF INJECTION ON A TURBULENT BOUNDARY LAYER,
For primary bibliographic entry see Field 08B.
W73-00035

MEASUREMENT OF THE SPECTRUM OF THE LONGITUDINAL COMPONENT OF THE PULSATION VELOCITY IN THE TURBULENT BOUNDARY LAYER OF A NON-NEWTONIAN FLUID,
For primary bibliographic entry see Field 08B.
W73-00036

COMBINING OPTIMIZATION WITH SURFACE-WATER FLOW,
ENWATS, Cambridge, Mass.
For primary bibliographic entry see Field 06A.
W73-00098

SUPERCRITICAL FLOW OVER SILLS AT INCIPIENT JUMP CONDITIONS,
Indian Inst. of Tech., New Delhi. Dept. of Applied Mechanics.
For primary bibliographic entry see Field 08B.
W73-00114

NUMERICAL COMPUTATION OF STRATIFIED NEARLY HORIZONTAL FLOWS,
Wimpey (George) and Co. Ltd., Hayes (England). Wimpey Central Lab.
For primary bibliographic entry see Field 08B.
W73-00117

HYDROGEOCHEMISTRY OF THE SURFACE WATERS OF THE MACKENZIE RIVER DRAINAGE BASIN, CANADA--I. FACTORS CONTROLLING INORGANIC COMPOSITION,
Department of the Environment (Alberta). Inland Waters Branch.
For primary bibliographic entry see Field 02K.
W73-00124

WATER CHEMISTRY OF THE AMAZON RIVER,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
For primary bibliographic entry see Field 02K.
W73-00126

KINEMATIC WAVE NOMOGRAPH FOR TIMES OF CONCENTRATION,
Maryland Univ., College Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 02A.
W73-00137

FLOODS PREDICTED FROM RAINFALL FREQUENCIES,
Idaho State Univ., Pocatello.
For primary bibliographic entry see Field 02A.
W73-00138

RIVER REGIME: RESEARCH AND APPLICATION,
Hydraulics Research Station, Wallingford (England).
For primary bibliographic entry see Field 08B.
W73-00143

HYDROLOGIC STUDIES OF SMALL WATERSHEDS, CALAVERAS CREEK, SAN ANTONIO RIVER BASIN, TEXAS, 1955-68,
Geological Survey, Austin, Tex.
For primary bibliographic entry see Field 04A.
W73-00205

STREAMFLOW CHARACTERISTICS OF THE ELK RIVER,
West Virginia Dept. of Natural Resources, Charleston. Div. of Water Resources.
M. S. Baloch, E. N. Henry, and W. H. Dickerson.
1970. 96 P, 49 FIG, 24 TAB.

Descriptors: *Streamflow records, *Surveys (Data collection), *Watersheds (Basins), *Drainage basins, Streamflow, West Virginia, Stream gages, Water supply, Hydrographs, Groundwater, Surface waters, Flow rates, Flow duration curves, Flow characteristics, Flow measurement.
Identifiers: *Elk River (West Virginia).

Surface streamflow records are available for selected West Virginia streams published cooperatively from the State Department of Natural Resources and the U. S. Geological Survey. It is published because the State finds it necessary to know the expected flow rate for a river or stream before water quality analyses can be realistically attempted. This report gives streamflow data for the Elk River Basin, including extremes of high and low flows, flow durations, estimates for the frequency or return period for given flows, and information on the season or time of year when the extremes of flow can be expected. Brief descriptions are given of the physical and hydrological features of the basins. These data were obtained from 6 gaging stations. (Poertner)
W73-00453

STREAM FLOW CHARACTERISTICS OF: GREENBRIER RIVER SUB-BASIN,
West Virginia Dept. of Natural Resources, Charleston. Div. of Water Resources.
For primary bibliographic entry see Field 06D.
W73-00457

COMPARISON OF THE EFFECTS OF SUPERFICIAL DIFFUSION IN A SCALE MODEL AND IN THE ST. LAWRENCE RIVER (COMPARAISON DES EFFETS DE DIFFUSION SUPERFICIELLE SUR MODELE REDUIT ET DANS LE FLEUVE ST. LAURENT),
Laval Univ., Quebec. Faculty of Sciences.
For primary bibliographic entry see Field 05B.
W73-00554

DISPERSIVE CHARACTERISTICS OF FREE SURFACE FLOW IN TERMS OF LAGRANGIAN DESCRIPTIONS,
Kyoto Univ. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 08B.
W73-00557

TURBULENCE CHARACTERISTICS OF OVERLAND FLOW,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
For primary bibliographic entry see Field 08B.
W73-00558

MOMENTUM TRANSFER FROM A JET TO A VORTEX,
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Ingenieria.
For primary bibliographic entry see Field 08B.
W73-00559

EXPERIMENTAL STUDIES OF THE PHENOMENA OF TRANSFER AT A JUNCTION OF TWO OPEN CHANNEL FLOWS WITH DIFFERENT DENSITIES AND TEMPERATURES (ETUDES EXPERIMENTALES DES PHENOMENES DE TRANSFERT A LA RENCONTRE DE DEUX ECOULEMENTS A SURFACE LIBRE DE DENSITE OU DE TEMPERATURE DIFFERENTE),
Laval Univ., Quebec. Faculty of Sciences.
For primary bibliographic entry see Field 08B.
W73-00570

CRITERIA FOR FULLY-MIXED TEMPERATURE REGIME IN STREAMS,
Tennessee Valley Authority, Norris. Engineering Lab.

W. O. Wunderlich, and L. N. Fan.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 1, p 243-250, 1972 (release date). 1 fig, 1 tab, 6 ref.

Descriptors: *Stratified flow, *Thermal stratification, *Path of pollutants, *Heated water, *Mixing, Froude number, Density, Density currents, Model studies, Hydraulic models, Thermal pollution, Mass transfer, Heat transfer, Momentum transfer, Turbulent flow.

Computation of water temperature variation in a stream is simple as long as the stream is fully-mixed. In this case, the stream participates practically instantaneously over its entire depth in heat exchange with the environment and remains homogeneous in temperature. Under some conditions, however, heat exchange with the environment directly affects only the layer near the water surface. From there, the heat is transferred into the water body below by internal turbulent and molecular diffusion. In this case, the computation of temperature variation becomes more complex, especially because thermal stratification may alter flow mechanics. Therefore, in practical applications, it is important to know whether the stream under study is fully mixed or stratified. The thermo-hydrodynamic criteria for both conditions are derived. In many streams, internal transfer is sufficiently intensive to distribute heat homogeneously over the entire depth. A layer of warm water on top of cold water may, however, appear and persist if the internal transfer remains below a critical level as, for example, in stagnant or very slowly moving water. Field data and a numerical model are used to demonstrate practical applications. (Knapp-USGS)
W73-00572

SOME EXPERIMENTAL INVESTIGATIONS ON THE BEHAVIOUR OF AIR-WATER INTERFACE IN AN OPEN CHANNEL TURBULENT FLOW,
Genoa Univ. (Italy). Inst. of Hydraulics.
For primary bibliographic entry see Field 08B.
W73-00582

PSEUDOMEANDERS AND POINT DUNES-- A FLUME STUDY,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Geography.
E. J. Hickin.
American Journal of Science, Vol 272, No 8, p 762-799, October 1972. 15 fig, 2 tab, 53 ref.

Descriptors: *Meanders, *Channel morphology, *Hydraulic models, *Supercritical flow, Turbulent flow, Erosion, Sedimentation, Sediment transport, Sedimentology, Scour, Flumes, Bed load, Sands, Particle size, Unsteady flow, Non-uniform flow, Roughness (Hydraulic), Hydraulics.
Identifiers: *Pseudomeanders.

Flume experiments were used to study supercritical and subcritical flows over coarse noncohesive sands. Subject to appropriate boundary definition, equilibrium channels can be formed by supercritical flows. The hydraulic geometry of such channels is presented in terms of the power functions commonly used to describe the morphology of natural channels; the associated flow character is also described in detail. Point dunes are the subcritical-flow counterparts of deposition associated with pseudomeanders. Discharge, water-surface slope, and the ratio of channel width to radius of channel curvature are independent variables in the pilot analyses of channel morphology and flow character associated with point dunes. Multiple plots of particle-size parameters provide effective criteria for distinguishing between bed and bank materials in the flume. (Knapp-USGS)
W73-00590

DRAINAGE INTENSITY IN WESTERN NEW YORK,
Montana State Univ., Bozeman. Dept. of Geography.
For primary bibliographic entry see Field 04A.
W73-00591

2F. Groundwater

NOMOGRAM FOR THE CONSTRUCTION OF FLOW NETS NEAR SINGULAR BOUNDARY POINTS,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
A. Vanden Berg.
Journal of Hydrology, Vol 16, No 4, p 301-306, August 1972. 3 fig, 1 tab, 1 ref.

Descriptors: *Flow nets, *Groundwater movement, *Boundaries (Surfaces), Model studies, Mathematical studies, Potential flow, Groundwater potential.
Identifiers: Nomograms.

Mathematical models of groundwater flow usually lack precision near singular points along an irregular boundary. Near such points the influence of the configuration of the flow net in the interior of the region becomes negligible and the flow net is almost entirely determined by the shape of the boundary. Complex variable theory is a convenient means for the construction of flow nets in areas between two intersecting straigth line boundaries which may be either streamlines or potential lines. A nomogram is presented for rapid determination of values of the flow potential at a sufficient number of points in a wedge of any angle to construct a reasonably accurate flow net. (Knapp-USGS)
W73-00018

COMMENTS ON THE USE OF A CALCIUM HARDNESS VARIABILITY INDEX IN THE STUDY OF CARBONATE AQUIFERS: WITH REFERENCE TO THE CENTRAL PENNINES, ENGLAND,
University Coll. of Swansea (Wales). Dept. of Geography.
For primary bibliographic entry see Field 02K.
W73-00020

HYDROLOGICAL INVESTIGATION OF THE MAGNESIAN LIMESTONE OF SOUTH-EAST DURHAM, ENGLAND,
Teesside Polytechnic, Middlesbrough (England). Dept. of Civil Engineering.
T. Cairney.
Journal of Hydrology, Vol 16, No 4, p 323-340, August 1972. 3 fig, 3 map, 2 tab, 8 ref.

Descriptors: *Karst hydrology, *Hydrogeology, *Aquifer testing, *Groundwater movement, *Water yield, Faults (Geologic), Groundwater resources, Drawdown, Theis equation, Boundaries (Surfaces), Permeability, Aquifer characteristics, Storage coefficient, Transmissivity.
Identifiers: Magnesian limestones, Jacob equation.

Exploration of the recently developed Magnesian Limestone aquifer in England is described. The aquifer, which is almost entirely covered by a blanket of glacial drift, has an abundance of groundwater flow boundaries. These boundaries were located by the Image Well Method. As a result of the groundwater boundaries, pumping test analysis by the Theis Non-Equilibrium Method is less useful for the prediction of abstraction effects than the simpler Jacob analysis method. It is suggested that Magnesian Limestone-type aquifers are relatively common and that the Jacob analysis may be more appropriate than generally accepted. (Knapp-USGS)
W73-00021

AN ASSESSMENT OF POSSIBLE FACTORS CONTRIBUTING TO WELL LEVEL FLUCTUATIONS IN HOLDERNESS BOULDER CLAY, EAST YORKSHIRE,
Hull Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 04B.
W73-00022

ON THE NUMERICAL COMPUTATION OF STRATIFIED GROUNDWATER FLOW,
M. B. Abbott, A. F. Ashamalla, and G. S. Rodenhuis.
International Association of Hydrological Sciences Bulletin Vol 17, July 1972. p 177-182, 5 fig.

Descriptors: *Stratified flow, *Groundwater movement, *Numerical analysis, Mathematical models, *Computer programs, Hydrogeology, Permeability, Water yield, Specific yield.

A numerical procedure is described for the computation of a two-layer horizontal groundwater flow in a homogeneous aquifer overlying a horizontal impermeable base. The procedure can be extended to more than two layers and to any base configuration. The fluid density is assumed to be constant throughout each layer. The numerical procedure has second-order accuracy and is unconditionally stable. As it contains no iterative routines, it is also exceptionally economical in computing time and memory requirements. (Knapp-USGS)
W73-00023

A THREE-DIMENSIONAL MODEL TO COMPUTE LAND SUBSIDENCE,
Centro di Ricerca IBM di Venezia (Italy).
G. Gambolati.
International Association of Hydrological Sciences Bulletin Vol 17, July 1972. p 219-226, 2 fig, 15 ref.

Descriptors: *Land subsidence, *Subsidence, *Withdrawal, Drainage, Water table, Hydrogeology, Model studies, Mathematical models, Groundwater, Water levels, Water pressure, Porous media.

Suggestions are given to improve the existing analytical three-dimensional models to predict land subsidence due to the extraction of fluids from natural reservoirs. The general equations of recent poro-elastic theory are used, and a new, more generalized, three-dimensional approach is derived; the previous models are particular cases. The contribution to land subsidence of depressurized oil or water bearing strata is separated from the contribution of the surrounding strata. It is possible in this way to take into account the different physical properties of the reservoir and of the remaining medium. The elastic model can be considered as a limit poro-elastic model, and therefore its application appears more strictly correlated with the real condition of the sub-soil. In particular, the model by McCann and Wilts (1951) proves to be advantageous only when the depressurized reservoir is much more liable to deformation than the surrounding medium. (Knapp-USGS)
W73-00026

BARIUM AND STRONTIUM IN GROUNDWATERS OF MESOZOIC-CENOZOIC SEDIMENTARY DEPOSITS IN THE CRIMEAN STEPPE ZONE (RASPROSTRANENIYE BARIYA I STRONTSIYA V PODZEMNYKH VODAKH MEZOKAYNOZOYSKIKH OTLOZHENIY STEPNOGO KRYMA),
Nauchno-Issledovatelskii Institut Prirodnykh Gazov, Kharkov (USSR).
For primary bibliographic entry see Field 02K.
W73-00038

EFFECTS OF ACIDITY AND ALKALINITY OF GROUNDWATER ON CONCENTRATION AND

MIGRATION OF RARE ELEMENTS (VLIYANIYE KISLOTNO-SHCHELOCHNYKH USLOVIY PODZEMNYKH VOD NA KONTSENTRATSIYU I MIGRATSIYU V NIKH REDKIKH ELEMENTOV),
All-Union Scientific Research Inst. of Hydrogeology and Engineering Geology, Moscow (USSR).
For primary bibliographic entry see Field 02K.
W73-00039

WATER DEVELOPMENT ON TROPIC VOLCANIC ISLANDS--TYPE EXAMPLE: HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
For primary bibliographic entry see Field 04B.
W73-00128

DESIGN OF ANALOG MODEL FOR AQUIFER RESPONSE STUDIES, USING A DIGITAL MODEL,
Waterloo Univ. (Ontario).
M.-J. Verge.
Ground Water, Vol 10, No 5, p 33-37, September-October 1972. 3 fig, 8 ref.

Descriptors: *Computer programs, *Analog models, *Instrumentation, Networks, Finite element analysis, Resistance networks, Hydrogeology.
Identifiers: *Analog model designing.

The design and construction of a resistor-capacitor analog model for aquifer response analysis is often a trial-and-error process which involves selecting a compatible set of components, assembling, testing and frequently replacing some components until a reasonable match is obtained between the model response and field observations. This process may be time-consuming and costly. A simple digital computer program based on the finite difference method uses as input transmissibility, leakage, storage coefficient, and boundaries. The program calculates the aquifer parameters and relates them to commercially available electrical components, and then tests the grid for compatibility. Simulation then finds the hydrogeologic parameters that will produce the best fit to the response observed in the field. The output consists of a list of the electrical components, their relative position in the model and the potential drop at every node of the grid for different time intervals. The analog model can then be built directly, avoiding the time and cost of replacement of components. Data from the dewatering project for the realignment of the Welland Canal between Lake Erie and Lake Ontario were used to test and demonstrate the usefulness of the digital computer program. (Knapp-USGS)
W73-00131

THE USE OF RESISTIVITY TECHNIQUES TO DELINEATE ACID MINE DRAINAGE IN GROUND WATER,
Pennsylvania State Univ., University Park. Coll. of Earth and Mineral Sciences.
For primary bibliographic entry see Field 05B.
W73-00132

GOOD COFFEE WATER NEEDS BODY,
Ohio State Univ., Columbus. Dept. of Geology.
For primary bibliographic entry see Field 05B.
W73-00133

A BASIN STUDY OF GROUND-WATER DISCHARGE FROM BEDROCK INTO GLACIAL DRIFT, PART II--ESTIMATE OF DISCHARGE,
Oklahoma State Univ., Stillwater.
D. C. Kent, and L. V. A. Sendlein.
Ground Water, Vol 10, No 5, p 24-32, September-October 1972. 5 fig, 3 tab, 8 ref.

Descriptors: *Groundwater basins, *Hydrogeology, *Mathematical models, *Aquifers, *Water yield, Groundwater movement, Water balance, Hydrologic budget, Recharge (Water), Iowa, Artesian aquifers, Confined water.

A subsurface ground-water budget equates subsurface recharge from the bedrock aquifer to discharge through sand and gravel and to discharge by pumping. The Darcy equation is used to compute recharge and discharge flow rates. Estimates of permeability were obtained from existing pump-test data and the hydraulic gradients were determined from the piezometric map. Two conceptual models are proposed to account for the maximum and minimum cross sectional areas of the bedrock aquifer through which ground water could flow into the sands and gravel; they represent the maximum and minimum limits of recharge. Bedrock recharge between 0.23 mgpd and 2.5 mgpd is possible for an 800-square mile basin. (See also W72-12379) (Knapp-USGS)
W73-00187

MICROEARTHQUAKES AT THE GEYSERS GEOTHERMAL AREA, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
R. M. Hamilton, and L. J. P. Muffler.
Journal of Geophysical Research, Vol 77, No 11, p 2081-2086, Apr 1972. 2 fig, 15 ref.

Descriptors: *Geothermal studies, *Mapping, *Seismic studies, *Seismology, *Geysers, Geothermal prospecting, Faults (Geology), Instrumentation, Monitoring, Epicenters, Earthquakes, Earthquake focus, Pore pressure, California, Bibliographies, Seismic investigations, Seismographs, Geology.
Identifiers: *Microseisms, *Geothermal investigations, Geothermal resources.

To determine whether earthquake activity was related to the area being developed for geothermal power, 8 radio-telemetry seismograph stations recorded microearthquakes in The Geysers area of northern California for 3 weeks. Locations were determined for 53 earthquakes within about 10 km of The Geysers. Most epicenters lie in a zone about 4 km long and 1 km wide passing through the geothermal field along a principal fault zone. Focal depths in this trend range from near surface to about 4 km. A composite fault-plane solution indicates dextral strike-slip faulting on a NNW-striking plane subparallel with the regional fault pattern. Results suggest that accurate mapping of microearthquakes can be useful in exploration for geothermal resources when the earthquakes studied were not caused by developing the geothermal field. (USBR)
W73-00326

FINGEROIMBIBITION IN GROUNDWATER REPLENISHMENT THROUGH INHOMOGENEOUS MEDIUM WITH SLIGHTLY VARYING PHASE DENSITY,
S. V. Regional Coll. of Engineering and Technology, Surat (India). Dept. of Mathematics.
A. P. Verma.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 251-258, 1972 (release date). 3 fig, 27 ref, 2 append.

Descriptors: *Recharge, *Infiltration, *Unsaturated flow, *Groundwater movement, *Stratified flow, Wettability, Wetting, Viscosity, Salinity, Path of pollutants, Mixing, Injection wells.

Finderoimbibition may be defined as the special phenomenon in which injection into saturated porous media occurs with displacement of the relatively more viscous native water irregularly, producing finger-shaped zones. A theoretical model of Fingeroimbibition in groundwater replenishment through inhomogeneous porous medium assumes a well developed system of randomly oriented fissures. The basic assumptions underlying the model are that the native and injected water form two immiscible liquid phases of different salinities with small viscosity difference, and further, that the injected water is regarded as preferentially wetting, less viscous, and with slightly varying density. The nonlinear differential system governing this phenomenon was formulated, and an approximate mathematical solution may be obtained by using a perturbation method. This gives an analytical expression for the distribution of injected water phase. (Knapp-USGS)
W73-00573

THE DISPERSION OF MATTER IN THE FLOW THROUGH AN IDEALIZED POROUS MEDIUM,
Tokyo Univ., (Japan). Dept. of Civil Engineering.
N. Tamai.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 259-266, 1972 (release date). 5 fig, 2 tab, 5 ref.

Descriptors: *Saline water intrusion, *Dispersion, *Saturated flow, *Mathematical models, *Porous media, Turbulent flow, Eddies, Vortices, Turbulence, Mixing, Diffusion, Numerical analysis, Groundwater movement.

The flow pattern of a viscous fluid in an idealized, two-dimensional porous medium was determined by numerical integration of the governing differential equations. The complete form of the Navier-Stokes equations was employed. The Reynolds number of the flow, based on the prescribed discharge, was less than 3.5. The zone of separation, assuming symmetric flow, exists at the rear of a cylinder in the flow region with infinitely large numbers of circular cylinders. Based on the computational results, the porous medium was divided into two alternate layers. The region where the main body of fluid passed was simulated by a layer with high hydraulic permeability. The eddy region was represented by a practically impermeable layer. The longitudinal dispersion coefficient for the alternate layer system was analyzed. A selection of flow patterns as well as curves showing the variation with Reynolds numbers of the dispersive characteristics of the idealized porous medium are presented. (Knapp-USGS)
W73-00574

NUMERICAL METHOD FOR GROUNDWATER HYDRAULICS,
Environmental Protection Agency, Annapolis, Md. Water Quality Office.
R. L. Crim.
EDA Technical Report 52, February 1972. 16 p, 7 fig, append.

Descriptors: *Groundwater movement, *Fluid mechanics, *Computer models, *Computer programs, Systems analysis, Input-output analysis, Model studies, Darcys Law, Numerical analysis.

With high-speed computers, many problems in fluid mechanics and groundwater hydraulics can be solved using only basic principles. The program presented in an application to many problems using only Darcy's Law and the continuity equation. The program was verified against an analytical solution to a single well field. Flows in the aquifer are obtained from the computer output. Seepage from a stream can be simulated by fixing the heads along the watercourse at the elevation of the stream. Sloping aquifers are simulated by varying the channel depths and/or starting heads. Smaller or larger grid sizes can be accommodated by lowering or raising the integration step. Instability may occur if a large step is used on a small network. Conversely, excessive time may be required to reach a steady state when using a small step on a large network. (Woodard-USGS)

W73-00593

2G. Water in Soils

SOIL MOISTURE MEASUREMENT,
V. Lednicky, and V. Richter.
Available from NTIS, Springfield, Va N72-15326 as NASA TT F-14, 137 - Price $3.00 paper copy; $0.95 cents microfiche. National Aeronautics and Space Administration Technical Translation, NASA TT-F-14, 137, 1972. 10 p, 3 fig, 2 tab, 15 ref. Trans. of Prispevek K Mereni Pudni Vihkosti, Meteorologicke Zpravy, Prague, Vol 22, No 1, p 28-31.

Descriptors: *Soil moisture meters, *Instrumentation, *Tensiometers, *Soil water movement, *Data collections, Methodology, Evaluation, Infiltration, Capillary action, Groundwater movement.
Identifiers: *Czechoslovakia.

The construction and operation of the Gallenkamp tensiometer and the results of soil moisture measurements made with the instrument at the Ostrava-Poruba station, Czechoslovakia, are presented. The relationship between soil moisture measurements, atmospheric precipitation, and evaporation are discussed. By use of several tensiometers with bowls at various depths it is possible to follow how water soaks into the soil from the surface and how water rises toward the surface in a dry period. Thus the influence of underground water on the regime of soil moisture can be determined. (Woodard-USGS)
W73-00119

THERMODYNAMIC PROPERTIES OF WATER ADSORBED ON DRY SOIL SURFACES,
Hawaii Univ., Honolulu.
M. L. Sharma, G. Uehara, and J. A. Mann, Jr.
Soil Science, Vol 107, No 2, p 86-93, February 1969. 8 fig, 1 tab, 23 ref.

Descriptors: *Soil water, *Thermodynamic behavior, *Thermal properties, *Soil properties, *Hawaii, Adsorption, Isotherms, Analytical techniques, Moisture content, Enthalpy, Entropy, Vapor pressure, Equations.
Identifiers: *Dry soil surfaces.

Water vapor adsorption isotherms for Molokai and Wahiawa soils in Hawaii were obtained at 25 C and 30 C by using a high-vacuum apparatus. An equation was used to calculate the specific surface areas. Taking liquid water as the standard state, both integral and differential thermodynamic quantities--enthalpy, entropy, and free energy--were calculated. Integral entropies were taken as a measure of the adsorbed-water molecular ordering. Results strongly suggested that at all relative vapor pressures (up to 0.6), the water adsorbed on the Molokai soil was more disordered than the water adsorbed on the Wahiawa soil. However, comparatively high numerical values for heat of adsorption, integral and differential entropy, and spreading pressure, as well as the shapes of the adsorption isotherms, showed that chemisorption plays an important role in the adsorption process. Highly temperature-dependent adsorption in both soils suggested that the soil surfaces were not inert. (Woodard-USGS)
W73-00120

TABLES OF WATER CONTENT-DENSITY RELATIONS FOR SATURATED SOILS,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia).
J. G. Lang.
Division of Soil Mechanics, CSIRO, Victoria, Australia, Technical Memorandum No 7, 1968. 12 p, 6 tab, 1 ref.

Descriptors: *Soil moisture, *Saturated soils, *Moisture content, *Density, *Hydrologic data, Data collections, Soil properties, Soil mechanics, Equations.
Identifiers: *Australian soils.

In the Australian environment, soils may be saturated, quasi-saturated, or partially saturated. While soil suction measurements would be preferable in most cases, the degree of geometric saturation is often useful in interpreting the results of tests. For example, when the results of immediate undrained triaxial compression test (without pore pressure measurements) are being studied, the degree of saturation can give additional understanding. Tables show the saturation water content of soil at various dry densities and particle specific gravities. The tables can be used in routine soil mechanics calculations. Tables for both British and Metric units are included. (Woodard-USGS)
W73-00121

A REVIEW OF METHODS FOR THE DETERMINATION OF THE MOISTURE FLOW PROPERTIES OF UNSATURATED SOILS,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia).
B. G. Richards.

Descriptors: *Soil moisture, *Soil water movement, *Unsaturated flow, *Flow measurement, Analytical techniques, Soil properties, Permeability, Capillary action, Infiltration, Diffusion, Equations, Theoretical analysis, Forecasting.
Identifiers: *Australian soils, *Unsaturated soils, Outflow data, Pressure plate apparatus.

The most satisfactory technique for measuring the unsaturated permeability function over the whole moisture suction range commonly found in Australian soils consists of using the outflow data from the pressure plate apparatus. A number of acceptable methods using this technique are reviewed and the principles of a new rapid method are described in which the final outflow volume is not measured, but estimated. Although this method is not as accurate as those using an accurately measured value for the final outflow volume, in many instances the difficulty and the time involved in accurately measuring the final outflow volume may not be warranted. This applies particularly to clay soils of low permeability, where, in addition to the long times required, the secondary permeability effects and water vapor losses from the apparatus make accurate determinations of the final outflow volume very difficult. (Woodard-USGS)
W73-00144

PEDOLOGICAL INFLUENCE OF SPRUCE PLANTED ON FORMER BEECH FOREST SOILS IN SCANIA, SOUTH SWEDEN,
Lund Univ. (Sweden). Dept. of Plant Ecology.
B. Nihlgard.
Oikos. Vol 22, No 3, p 302-314. 1971. Illus.
Identifiers: *Soil-water-plant-relationships, Ammonium, Beech D, Calcium, *Forests, Iron, Phosphates, Podzolization, Potassium, Soils, *Spruce G, *Sweden.

Soil conditions were investigated in South Swedish localities where beech forest and first generation planted spruce exist side by side. The main study area was at Kongalund; further observations were made at Slatterod, Bokeberg and 20 more localities. When beech is replaced by spruce, the physical properties of the upper soil horizon change, there is an accumulation of organic matter and more forms at the soil surface. The amount of available water decreases and less rainwater supplements the underground water. There is less exchangeable K and Ca in the upper horizon of spruce forest soil, but more Fe, PO4 and acid substances resulting in a decrease in pH to a depth of 50 cm or more. Less nitrification and a greater mobilization of mineralized NH4 occurs in spruce than in beech forest soil. It is concluded that soils of moderately good mineral composition uninfluenced by underground water suffer the most damage from podzolization when planted with spruce.--Copyright 1972, Biological Abstracts, Inc.
W73-00160

SOIL SOLUTION SAMPLING SYSTEM FOR FLOODED SOILS,
Commonwealth Scientific and Industrial Research Organization, Darwin (Australia). Div. of Land Research.
B. G. Williams.
Soil Sci. Vol 112, No 6, p 454-455. 1971. Illus.
Identifiers: *Conductivity, *Redox potential, Sampling, *Soil analysis, Soils, Solution, *Hydrogen ion concentration.

A description is given of the installation of a 6-in. diameter access tube, from which sample tubes protrude horizontally and at different depths. With portable instruments the pH, redox potential and conductivity of the soil solution can be increased in situ at any desired frequency. Gaseous exchange during measurement is unlikely to interfere. The sampling system is inexpensive and can be modified to suit other applications.--Copyright 1972, Biological Abstracts, Inc.
W73-00214

LONG-TERM EFFECTS OF SALINE IRRIGATION WATER ON SATURATION EXTRACT DETERMINATION OF A CLAY SOIL IN THE LOCKYER VALLEY, QUEENSLAND,
Queensland Agricultural Coll., Lawes (Australia).
R. J. Talbot, T. Dickson, and I. J. Bruce.
Queensl J Agr Anim Sci. Vol 28, No 1, p 1-11. 1971. Illus.

Descriptors: *Australia, *Clays, Irrigation, *Lockyer V Valley, Saline waters, Salinity, Saturation, Soils.

The soils, consisting of heavy self-mulching clay were irrigated for periods of 5, 15 and 25 yr, respectively. Conductivity and ionic composition of saturation extracts covering 3 ft of profile were measured to gauge the extent of salinization resulting from the irrigation treatments applied. The increase in water-soluble salts to a depth of 2 ft is rapid during the first 5 yr of irrigation, but thereafter the increase is more gradual. After 15 yr of irrigation the profile to a depth of 30 in was salinized as indicated by conductivity determinations of saturation extracts in excess of 4.0 mnhos/cm. Highest levels of salinity are encountered in the 12-24 in portion of the profile. Increases in salinity were accompanied by increases in pH.--Copyright 1972, Biological Abstracts, Inc.
W73-00221

PHYSICO-CHEMICAL PROPERTIES OF WATER-STABLE AGGREGATES IN THE MAIN SOIL TYPES OF TADZHIKISTAN (IN RUSSIAN),
V. P. Sosnovskaya.
Tr Tadzh Nauchno-Issled Inst Pochvoved Vol 13, No 2, p 20-35. 1970.
Identifiers: *Soil properties, Aggregates, Carbonate, Compaction, Distribution, Fulvic acid, Organic matter, Soils, *Tadzhikistan, USSR.

The quality of the structure of soils as a function of their texture and the nature of 'binders' was studied for the upper horizons of zonal soils. Investigation of aggregates 3-2 mm, 2-1 mm, 1-0.5 mm and <0.25 mm revealed that the aggregates in sierozems were uniformly impregnated by organic matter (fulvic acids and their compounds with carbonates), in contrast to the aggregates in mountain cinnamon and meadow soils with their nonuniform, nodal distribution of organic matter and distinct contouring of some aggregates, due to

migration of humic acids and R2O3 to their surface. Compaction was higher in smaller aggregates. The types of structure formation are given.--Copyright 1972, Biological Abstracts, Inc.
W73-00259

SOIL ASSOCIATIONS AND LAND CLASSIFICATION FOR IRRIGATION, SIERRA COUNTY,
New Mexico Agricultural Experiment Station, University Park.
For primary bibliographic entry see Field 03F.
W73-00267

COLORIMETRIC DETERMINATION OF ALUMINUM IN SOIL EXTRACTS USING HAEMATOXYLIN,
Commonwealth Scientific and Industrial Research Organization, Glen Osmond (Australia). Div. of Soils.
For primary bibliographic entry see Field 05A.
W73-00283

DETERMINATION OF FLUORINE AND BROMINE IN HALOGENATED HERBICIDE RESIDUES IN SOIL BY SPARK SOURCE MASS SPECTROMETRY,
Cornell Glass Works, N.Y. Research and Development Labs; and Cornell Univ., Ithaca, N.Y. Pesticide Residue Lab.
For primary bibliographic entry see Field 05A.
W73-00304

SOIL ENRICHMENT FOR THE ISOLATION OF SPORANGIAL SUBGROUP II BACILLUS SPECIES, AND OBSERVATIONS CONCERNING A COIL-FORMING MEMBER OF THIS GROUP,
Pennsylvania State Univ., University Park. Dept. of Microbiology.
For primary bibliographic entry see Field 05A.
W73-00424

DEGRADATION OF DDT IN SOIL UNDER THE INFLUENCE OF MICROORGANISMS,
All-Union Scientific Research Inst. of Chemical Means of Protecting Plants, Moscow (USSR).
For primary bibliographic entry see Field 05B.
W73-00440

WATER PERMEABILITY OF IRRIGATED SOILS IN THE BUKHARA OASIS (IN RUSSIAN),
For primary bibliographic entry see Field 03F.
W73-00480

SOILS IN THE FLOODPLAIN OF THE VYSSA RIVER (IN RUSSIAN),
A. N. Tyuryukanov, and T. L. Bystritskaya.
Tr Kaluzhskoi Gos Obl S-Kh Opytn Stn. 7: p 40-45. 1970.
Identifiers: *Soil properties, *Soil chemical properties, Composition, Floodplains, Morphology, Peat, Rivers, Soils, USSR.

The morphology and physicochemical properties of sod calcareous floodplain soils along the river channel, meadow calcareous floodplain soil in the central part of the floodplain and meadow bog sandy soil on buried peat bog in the near-terrace portion of the floodplain are described. The contents of Mn, Co, Ni, Cr, V, Cu and Zn in the soils, as well as the chemical composition of the Verstynskoe peat are given.--Copyright 1972, Biological Abstracts, Inc.
W73-00491

POTASSIUM STATUS OF LEACHED CHERNOZEM IN THE KRASNODAR TERRITORY, (IN RUSSIAN),
Y. G. Pogorelov.
Tr Kuban S-Kh Inst. Vol 20, No 48, p 20-26. 1970.
Identifiers: *Soil treatment, Chernozem, Fixation, Forms, Krasnodar, *Potassium, USSR.

K fertilizers increased the content of exchangeable K in soil only for a short time following their application, while the amount of nonexchangeable K increased several times in comparison to its content in the fertilizers. No migration of K from the fertilizers over the soil profile was detected. K became fixed in the soil at the sites of its application and was converted to the exchangeable and nonexchangeable forms.--Copyright 1972, Biological Abstracts, Inc.
W73-00499

SOILS OF THE KANT DISTRICT, (IN RUSSIAN),
T. D. Nekrasova.
Izv Kirg Fil Vses O-Va Pochvoved. 5. p 46-56. 1970.
Identifiers: *Soil properties, *Soil treatment, Amelioration, Kant, Morphology, Soils.

The Kant District contains dark chestnut, meadow, meadow bog and sierozem meadow soils. The morphology of soils, their mode of occurrence and certain physiocochemical properties are described. A tentative ameliorative differentiation of these soils and a ageomorphological zoning of the territory in the basin of the Chu River and proposed. The chief ameliorative practices for saline soils are gypsuming and application of physiologically acid fertilizers and deep plowing, as well as measures for regulating the groundwater levels.--Copyright 1972, Biological Abstracts, Inc.
W73-00501

THE MINERALOGY AND CHEMISTRY OF HIGH PLAINS PLAYA LAKE SOILS AND SEDIMENTS,
Texas Tech Univ., Lubbock. Water Resources Center.
B. L. Allen, B. L. Harris, K. R. Davis, and G. B. Miller.
Available from the National Technical Information Service as PB-212 605, $3.00 in paper copy, $0.95 in microfiche. WRC-72-4, July 1972. 75 p, 23 fig, 13 tab, 14 ref, 2 append. OWRR B-004-TEX (2). 14-01-0001-1551.

Descriptors: *Playas, *Mineralogy, *Sediments, *Soil texture, Clays, Silts, Sands, *Soil chemical properties, Aquifers, Recharge, *Texas, *New Mexico.
Identifiers: *Southern High Plains.

Ubiquitous shallow depressions, locally called 'playas,' dot the southern High Plains of West Texas and eastern New Mexico. They range in size from a fraction of an acre to more than 200 acres. The playas hold water intermittently and have no external drainage. The primary objectives of the study were (1) to characterize the mineralogy of a playa soil and underlying sediments from each of the soil textural zones, (2) to determine selected chemical and physical properties of the soils from the same playas, and (3) to determine the relationships of the playa sediments to the associated upland soils. Detailed studies were performed on only three playas, but it is believed that the results can be extrapolated to a high percentage of those on the High Plains. The High Plains playa soils have similar profile morphologies suggesting similar mineralogical and physical properties. Very clayey (more than 50% clay) soils occur in the playas. Silt/sand ratios in the playa soils reflect the textural influence of the associated upland soils and progressively decrease from the fine-textured to the coarse-textured zone. Similar ratios between the playa and upland soils suggest local alluvium as the principal parent sediment of the former. The clay mineralogy of the playa soils is remarkably similar, regardless of the soil textural zone in which the playa is located. There are minor variations in most chemical properties among the playa soils, but some, such as CaCo3 equivalent, may vary appreciably. The clay mineralogy of the playa soils, together with the content of fine clay, generally explains why successful aquifer recharge operations have been short lived. (Runkles-Texas)
W73-00544

MODE OF FORMATION AND GEOTECHNICAL CHARACTERISTICS OF LATERITE MATERIALS OF GHANA IN RELATION TO SOIL FORMING FACTORS,
Council for Scientific and Industrial Research, Kumasi (Ghana). Building and Road Research Inst.
M. D. Gidigasu.
Engineering Geology, Vol 6, No 2, p 79-150, August 1972. 47 fig, 7 tab, 171 ref.

Descriptors: *Soil physical properties, *Soil formation, *Laterites, *Africa, Humid climates, Soil types, Clays, Clay minerals, Bearing strength, Compaction, Soil tests, Soil strength, Compressibility, Particle size, Mineralogy, Plasticity, Shear strength, Soil mechanics.
Identifiers: *Ghana.

From knowledge of particle-size distribution and plasticity in most soils it is possible to infer their engineering behavior based upon the characteristics of other soils of similar classification. No straightforward relationship exists for laterite materials and the particle-size distribution and plasticity do not permit useful correlations between laboratory test results and field behavior. Laboratory tests on many temperate and tropical surface soils show that these two soil types are similar in their mechanical properties. However, the field behavior of the two soils is not similar. No attempt to identify the significant geotechnical characteristics of tropical soils can succeed if it is not based on knowledge of tropical weathering and soil-forming processes. The geotechnical characteristics of Ghanaian laterite materials are strongly affected by soil-forming factors. Approximate ranges of characteristics were established for each genetic fine-grained soil group on the basis of the clay content and other soil-forming factors. (Knapp-USGS)
W73-00588

THE WORLD OF UNDERGROUND ICE,
British Columbia Univ., Vancouver. Dept. of Geography.
For primary bibliographic entry see Field 02C.
W73-00592

INTERPRETATION OF THE WATER AND MINERAL NITROGEN PROFILES IN BARE OR STRAW-COVERED PARCELS OF LAND USING A MATHEMATICAL MODEL,
Centre de Recherches Agronomiques de Provence, Antibes (France). Station d'Agronomie et de Physiologie Vegetale.
J. Muller, and F. Brun.
Bull Assoc Fr Etud Sol. (5) p 25-31. 1970.
Identifiers: *Model studies, *Soil water movement, Depth, Diffusion, Equations, *Fertilizers, Humidity, Minerals, Mulch, Nitrogen, Profiles, Soils, Straw, Soil treatment, Mathematical modes.

Equations of diffusion were applied to water movement in the soil in order to interpret humidity variations as a function of depth and maximum humidity. The relationship giving the humidity h as a function of depth x was a relationship of the form: $h = H(1-e^{-px})$ in which p represented the probability of water film rupture. In bare, unfertilized plots of land and in plots of land into which straw was plowed, the term p remained constant causing a constant output of water. However, under mulch, p varied homographically with depth. The application of the equation of diffusion to the study of nitrate movement in the soil verified the validity of a simple mathematical model giving the

distribution of nitrates as a function of depth at a moment t. The study of this function allowed prediction of a maximum concentration of nitrates at a given level. Fitting the experimental values to the theoretical values verified the validity of the hypotheses and predicted that the maximum accumulation occurred at the 2-4 cm level and that the concentration was uniquely a function of the deep mineral N level and of the water profile. An increase in mineral and mineralizable N level under straw mulch was interpreted as the result of a reduction in water movement-consequently of the nitrates in the soil, and the storage of organic N in an easy-to-mineralize labile form.--Copyright 1972, Biological Abstracts, Inc.
W73-00607

COMPARATIVE STUDY OF THE EFFECT OF C-14 LABELED GLUCOSE AND C-14 LABELED STRAW ON THE STRUCTURAL STABILITY OF AN ACIDIC MUDDY SOIL,
Ecole National Superieure d'Agronomie, Nancy (France). Laboratoire de Pedol.
A. Guckert, E. Nussbaumer, and F. Jacquin.
Bull Ecole Nat Super Agron Nancy. Vol 12, No 1/2, p 26-49. 1970. Illus.

Descriptors: *Soil structure, *Soil stabilization, Acidic soil, Aggregation, Carbon-14, Glucose, Mud, Polysaccharides, Soils, Straw, Soil treatment.

A study on the effect of organic compounds on structural stability showed the predominant role of the polysaccharides of microbic origin in increasing the level of aggregation in an acidic muddy soil after the addition of either labeled glucose or labeled straw. Although the formation of aggregates under the experimental conditions required the presence of a threshold level of polysaccharides, there was a subsequent close correlation between the level of polysaccharides and the level of stable aggregates. Glucidic compounds acting as cement in the aggregates represented neoformed compounds, mainly in the nonalkaline extractable fraction. A 'young humin' was thus formed by a close bonding between the neoformed polysaccharides and the mineral fraction. However, this 'young humin' was partially labile and during incubation underwent either a mineralization or a more extensive humification with partial incorporation of the polysaccharides. The resulting stable humin, although having a lesser effect on aggregation, assured long term stabilization of the aggregates.--Copyright 1972, Biological Abstracts, Inc.
W73-00609

DETERMINATION OF SOLID-AIR SURFACE TENSION OF POROUS MEDIA,
California Univ., Riverside. Dept. of Soil Science and Agricultural Engineering.
S. Miyamoto, and J. Letey.
Soil Sci Soc Am Proc. Vol 35, No 6, p 856-859. 1971. Illus.
Identifiers: Coefficient, Determination, *Porous media, Sois, *Surface tension.

The advancing wetting condition at equilibrium in porous media by various kinds of pure liquids was considered theoretically based on Fowke's theory and the capillary tube model. Based on reasonable agreement between experimental data and theory, new methods to measure the surface tension of porous media were proposed.--Copyright 1972, Biological Abstracts, Inc.
W73-00612

TENSILE STRENGTH OF MONTMORILLONITE AS A FUNCTION OF SATURATING CATION AND WATER CONTENT,
Agricultural Research Service, St. Paul, Minn. Soil and Water Conservation Research Div.
R. H. Dowdy, and W. E. Larson.
Soil Sci Soc Am Proc. Vol 35, No 6, p 1010-1014. 1971.
Identifiers: *Cations, Clays, Homoionics, *Montmorillonite, Saturation, Axial strain, *Tensile strength.

Tensile strength, axial strain, and strain energy were determined for Na, K, Ca, Al, and Fe montmorillonite over the water vapor range (P/Po) from 0.02 to 0.92. Strength decreased from 366 kg cm-2 for Fe specimens at 0.02 P/Po to 19 kg cm-2 for Ca clay at 0.92 P/Po in the following order: Fe > K greater than or equal to Na > Al > Ca. Axial strain was independent of water content above 0.15 P/P0 for the Ge system. For Al, Ca, and K clays, strain was independent of water content above 0.4 P/Po. The greater strength and low strain of the Fe clay suggested that hydroxy Fe material may be the bonding agent in this clay, whereas the saturating cation played a dominant role in the strength-energy properties of the other homoionic clays.--Copyright 1972, Biological Abstracts, Inc.
W73-00613

EFFECT OF FERTILIZERS ON ERODED SOIL PRODUCTIVITY (IN UKRAINIAN),
For primary bibliographic entry see Field 03F.
W73-00629

BROWN DESERT STEPPE SOILS OF KENES--ANARKHAI (IN RUSSIAN),
G. I. Osadchi.
Izv Kirg Fil Vses O-Va Pochvoved 5. p 17-45. 1970.
Identifiers: *Soil properties, Soil chemical properties, Composition, Desert, *Kenes-anarkhai, Soils, Soil texture, USSR grasslands.

The soils are low in humus (0.6-0.9%) with a prevalence of fulvic acids (Ch/Cf = 0.4-0.7). They are calcareous, light textured and of a low absorption capacity, 6-9 meq/100 g soil; absorbed Na amounts to 5-7% of the absorption capacity. The soils are usually slightly saline with chlorides, and their lower horizons are rich in gypsum. Their moisture capacity is low and water permeability is high. When brought under cultivation, the soils require frequent irrigation.--Copyright 1972, Biological Abstracts, Inc.
W73-00645

2H. Lakes

VERTICAL TEMPERATURE STRUCTURE IN CRATER LAKE, OREGON,
Oregon State Univ., Corvallis. Dept. of Oceanography.
V. T. Neal, S. J. Neshyba, and W. W. Denner.
Limnology and Oceanography, Vol 17, No 3, p 451-453, May 1972. 1 fig, 15 ref.

Descriptors: *Lakes, *Thermal stratification, *Oregon, *Thermocline, *Water temperature, Profiles, Water pollution sources, Radioactivity.
Identifiers: *Crater Lake (Ore), *Meromictic lakes.

Vertical temperature profiles taken at different seasons in Crater Lake show an isothermal layer at 295 m with hyperadiabatic temperatures below that point. The lake is apparently meromictic, with circulation limited to the waters above mid-depth. (Knapp-USGS)
W73-00029

MAXIMUM UTILIZATION OF CALAVERAS COOLING LAKE FOR ELECTRIC GENERATION,
San Antonio City Public Service Board, Tex.
For primary bibliographic entry see Field 05D.
W73-00076

A COMPARATIVE MORPHOLOGIC DESCRIPTION OF THE SEVAN LAKE WHITEFISH (GENUS COREGONUS),
Akademiya Nauk SSR, Leningrad. Zoologicheskii Institut.
G. K. Shaposhnikova.
Vopr Ikhtion. Vol 11, No 4, p 575-586. 1971. Illus.
Identifiers: *Fish establishment, Coregonus, Coregonus lavaretus maraenoides, Genus, Lakes, Morphology, *Sevan lake, USSR, *Whitefish, *Armenia.

Biometric studies were conducted on the whitefish in Sevan Lake in Armenia. Introduction of C. laveretus maraenoides and C. laveretus ludoga was initiated in 1924, In 1969 evaluation of the specific characteristics of the whitefish in the lake showed that the vast majority of the specimens were of intermediate type, and only rarely were parental individuals encountered. The conclusion was reached that hybridization between the 2 spp. that had been introduced has not been completed as yet.--Copyright 1972, Biological Abstracts, Inc.
W73-00086

SELECTED PHYSICAL AND CHEMICAL CHARACTERISTICS OF 20 CALIFORNIA LAKES,
Geological Survey, Menlo Park, Calif.
R. T. Iwatsubo, L. J. Britton, and R. C. Averett.
Geological Survey Open-file Report, May 16, 1972. 59 p, 3 fig, 1 tab, 26 ref.

Descriptors: *Lakes, *Limnology, *Thermocline, *Water quality, *California, Physical properties, Chemical properties, Water chemistry, Water analysis, Chemical analysis, Data collections, Reservoirs.
Identifiers: *California lakes.

In the summers of 1969 and 1970 the U.S. Geological Survey made limnological surveys on 20 California lakes and reservoirs. The lakes ranged from the unenriched waters of the Sierra Nevada to the enriched lake waters in the Central Valley and northeast prairie region of the State. Temperature and dissolved-oxygen measurements showed that most of the lakes were thermally stratified and had well-defined metalimnions. Dissolved-oxygen profiles varied widely among the lakes. Three of the lakes had metalimnetic oxygen depletion, but most had the oxygen minimum near the bottom, at the sediment water interface. Alkalinity, pH, and specific conductance varied as a function of photosynthetic or respiratory activity of the biota. Light penetration estimated with a Secchi disk ranged from the middle depths of the clear Sierra Nevada lakes to near the surface in the enriched waters. Water samples collected at the 1-meter depth for the determination of the major dissolved chemical constituents showed wide chemical variations among the lakes. (Woodard-USGS)
W73-00203

USE OF TESTS FOR LIMITING OR SURPLUS NUTRIENTS TO EVALUATE SOURCES OF NITROGEN AND PHOSPHORUS FOR ALGAE AND AQUATIC WEEDS,
Wisconsin Univ., Madison. Water Chemistry Lab.
For primary bibliographic entry see Field 05C.
W73-00232

ECOLOGICAL STUDIES ON DISSOLVED OXYGEN AND BLOOM OF MICROCYSTIS IN LAKE SUWA--I. HORIZONTAL DISTRIBUTION OF DISSOLVED OXYGEN IN RELATION TO DRIFTING OF MICROCYSTIS BY WIND,
Shinshu Univ., Suwa (Japan). Suwa Hydrobiological Station.
For primary bibliographic entry see Field 05C.
W73-00236

UNDERSTANDING LAKES AND LAKE PROBLEMS,
Wisconsin Univ., Madison. Cooperative Extension Programs.
For primary bibliographic entry see Field 05G.
W73-00239

STUDIES ON DENITRIFICATION IN A BRACKISH LAKE,
Tokyo Univ. (Japan). Ocean Research Inst.
For primary bibliographic entry see Field 05C.
W73-00241

ECOLOGICAL STUDIES ON CRATER LAKES IN WEST CAMEROON ZOOPLANKTON OF BAROMBI MBO, MBOANDONG, LAKE KOTTO AND LAKE SODEN,
Westfield Coll., London (England). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W73-00248

EUTROPHICATION OF LAKE 227, EXPERIMENTAL LAKES AREA, NORTHWESTERN ONTARIO, BY ADDITION OF PHOSPHATE AND NITRATE,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
For primary bibliographic entry see Field 05C.
W73-00249

ECOLOGY OF PHYTOPLANKTON OF THE VOLTA LAKE,
Ghana Univ., Legon. Volta Basin Research Project.
For primary bibliographic entry see Field 05C.
W73-00256

SURVIVAL CHARACTERISTICS OF SALMONELLA IN THE FORT LOUDOUN RESERVOIR,
Tennessee Univ., Knoxville. Water Resources Research Center.
For primary bibliographic entry see Field 05C.
W73-00258

DESTRATIFICATION OF LAKES BY SELECTIVE WITHDRAWAL METHODS,
Wisconsin Univ., Madison. Water Resources Center.
P. L. Monkmeyer, J. A. Hoopes, and J. C. Ho.
Available from the National Technical Information Service as PB-212 582, $3.00 in paper copy, $0.95 in microfiche. Wisconsin Water Resources Center, Madison, Technical Report, 1972. 21 p, 2 fig, 26 ref. OWRR A-046-WIS (1). 14-31-0001-3550.

Descriptors: *Lakes, *Destratification, *Density stratification, *Withdrawal, *Hypolimnion, *Fluid mechanics, Momentum equation, Reservoirs, Reservoir releases, Theoretical analysis.
Identifiers: Impoundments, Selective withdrawal.

In this pilot study, mathematical models are developed to describe two-dimensional planar and three-dimensional axisymmetric withdrawal of a viscous, non-diffusive density-stratified fluid from the bottom of a reservoir. The differential equations which describe the flow and include inertial effects are solved using the well known Karman integral technique. Analytical solutions of the two-dimensional planar model show that the growth of the withdrawal layer is proportional to the one-fourth power of the distance from the sink. This prediction agrees closely with laboratory experiments. The axisymmetric model predicts growth of the withdrawal layer proportional to the one-fourth power of the logarithm of the radial distance from the sink. Although no laboratory verification is available at this time, an experimental study of the axisymmetric model is under way.
W73-00264

STEPHANODISCUS BINDERANUS (KUTZ.) KRIEGER OR MELOSIRA BINDERANA KUTZ. (BACILLARIOPHYTA, CENTRALES),
Bristol Univ. (England). Dept. of Botany.
For primary bibliographic entry see Field 05C.
W73-00432

SEASONAL FOOD HABITS OF ADULT WHITE CRAPPIE, POMOXIS ANNULARIS RAFINESQUE IN CONOWINGO RESERVOIR,
Alabama Cooperative Fishery Unit, Auburn.
Dilip Mathur.
Am Midl Nat. Vol 87, No 1, p 236-241. 1972.
Identifiers: Amphipods, *Conowingo reservoir, Crappie, *Cyclops, *Daphnia, Etheostoma-Olmstedi, *Food habits, Insects, Lepomis-Spp, Maryland, Pennsylvania, Plankton, Pomoxis-Annularis, Reservoirs, Seasonal, *White crappie.

Stomach contents of 903 adult white crappie (160 to 310 mm fork length) collected from June 1966 TO Dec. 1967 in Conowingo Reservoir were analyzed. By volume, zooplankton and small fishes were dominant food items in most of the spring, summer and autumn months, whereas amphipods predominated in the winter months. Insects and plant material were least important in the diet. Based on percentage frequency of occurrence, amphipods were found most frequently in the stomachs throughout the year. Dipterans (midge larvae and pupae) ranked next in importance. Zooplankters (Cyclops and Daphnia), sunfishes (Lepomis spp.) and johnny darter (Etheostoma olmstedi) appeared most frequently in the spring, summer and autumn months. The wide variety of organisms in the diet suggested opportunistic feeding habits. Feeding activity was heaviest in June through Oct., moderate in April, May and Nov., and lowest in the winter months.--Copyright 1972, Biological Abstracts, Inc.
W73-00619

DISTRIBUTION AND ECOLOGICAL FEATURES OF HYDROPHYTES IN THE POLLUTED LAKE VANAJAVESI, S. FINLAND,
Helsinki Univ. (Finland). Dept. of Botany.
For primary bibliographic entry see Field 05C.
W73-00631

BENTHIC COMMUNITY METABOLISM IN BAY QUINTE AND LAKE ONTARIO,
Guelph Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W73-00633

PRODUCTION OF BENTHIC MACROINVERTEBRATES OF BAY OF QUINTE AND LAKE ONTARIO,
Guelph Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W73-00634

ASSOCIATIONS AND SPECIES DIVERSITY IN BENTHIC MACROINVERTEBRATES OF BAY OF QUINTE AND LAKE ONTARIO,
Guelph Univ. (Ontario). Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W73-00635

2I. Water in Plants

DESICCATION INJURY IN MOSSES: I. INTRASPECIFIC DIFFERENCES IN THE EFFECT OF MOISTURE STRESS ON PHOTOSYNTHESIS,
Manchester Univ. (England). Dept. of Botany.
J. A. Lee, and G. R. Stewart.
New Phytol. Vol 70, No 6, p 1061-1068. 1971. Illus.
Identifiers: *Moisture stress, *Mosses, Acrocladium cuspidatum, Climacium dendroides, Desiccation, Habitats, Hypnum cupressiforme, Photosynthesis.

Intraspecific differences in desiccation injury are shown in collections of Acrocladium cuspidatum, Climacium dendroides and Hypnum cupressiforme from habitats subjected to a wide range of moisture stresses. The degree of desiccation tolerance is correlated with degree of moisture stress in the habitat. Desiccation injury was measured as the decline in the initial rate of photosynthesis on remoistening. Collections of species from habitats in which severe moisture deficits occur show a slower decline in photosynthesis on desiccation and a more rapid recovery of function on wetting than collections from habitats with no appreciable moisture deficits. The results are discussed in terms of their ecological and physiological significance.--Copyright 1972, Biological Abstracts, Inc.
W73-00010

EVALUATING SUMMER RAINFALL THROUGH A MULTILAYERED LARGETOOTH ASPEN COMMUNITY,
Petawawa Forest Experiment Station, Chalk River (Ontario).
J. R. Clements.
Can J For Res. Vol 1, No 1, p 20-31. 1971. Illus.
Identifiers: *Rainfall, *Aspen D, Bracken fern, Equations, Evaluation, Populus grandidentata D, Size, Stemflow, Storms, Summer, Canopy throughfall.

Results are presented of measurements, made separately for each of 4 canopy layers, of throughfall and stemflow in a multilayered stand of largetooth aspen (Populus grandidentata Michx.). Each canopy layer is identified by the predominant woody or fern species. Equations describe relationships between stemflow, stem size, and storm size, and between throughfall and storm size. In general, stemflow per stem per storm increased as both stem size and storm size increased, the latter having the greater effect. The equations varied with species. General stemflow equations were constructed to calculate stemflow per stem per storm for tree sizes and storm sizes within the measured range. Throughfall per storm increased as storm size increased, but at different canopy layers. Monthly budgets of interception, stemflow, and net rainfall for the various canopies, separately and together, were computed for the summer months of 1969 using the stemflow and throughfall equations, measured gross rainfall during all summer storms, and data on canopy structure for 4 plots within the stand. Interception by all canopies together amounted to 22 to 46% of monthly gross rainfall. Interception from the bracken fern canopy alone was 3 to 9%. Stemflow was about 8 to 17% of the monthly gross rainfall. The highest proportion of total stemflow was from bracken fern. Net rainfall was 54 to 78% of the monthly gross rainfall.--Copyright 1972, Biological Abstracts, Inc.
W73-00012

ESSENTIAL FATTY ACIDS IN THE DIET OF RAINBOW TROUT (SALMO GAIRDNERI): GROWTH, FEED CONVERSION AND SOME GROSS DEFICIENCY SYMPTOMS,
Oregon State Univ., Corvallis. Dept. of Food Science and Technology.
J. D. Castell, R. O. Sinnhuber, J. H. Wales, and D. J. Lee.
J Nutr. Vol 102, No 1, p 77-85. 1972. Illus.
Identifiers: *Fish physiology, *Fish diets, Conversion, Deficiency, Essential fatty acids, Feeds, Growth, Symptoms, *Trout.

Experiments are described to define further the fatty acid requirements of S. gairdneri. In all cases, feeding semipurified diets containing no polyunsaturated fatty acids resulted in poor growth and feed conversion. Linolenic acid was superior to linoleic in stimulating growth and improving feed conversion. The requirement of linolenic acid for rainbow trout is 1% of the diet or approximately 2.7% of the dietary calories. Essen-

tial fatty acid deficiency symptoms that were cured or prevented by linolenic acid included fin erosion, heart myopathy, and a shock syndrome. Linolenic acid has an essential role in rainbow trout similar to that assigned to linoleic acid in man and higher animals.--Copyright 1972, Biological Abstracts, Inc. (See also W73-00063 and W73-00064)
W73-00062

ESSENTIAL FATTY ACIDS IN THE DIET OF RAINBOW TROUT (SALMO GAIRDNERI): PHYSIOLOGICAL SYMPTOMS OF EFA DEFICIENCY,
Oregon State Univ., Corvallis. Dept. of Food Science and Technology.
J. D. Castell, R. O. Sinnhuber, D. J. Lee, and J. H. Wales.
J Nutr. Vol 102, No 1, p 87-92. 1972. Illus.
Identifiers: *Fish physiology, *Fish diets, Deficiency, Essential fatty acids, Symptoms, *Trout.

Certain physiological changes in S. gairdneri which may be attributed to a dietary insufficiency of the essential fatty acids of the linolenic series are described. A greatly increased mitochondrial swelling rate was induced in fish fed a fat-free diet. Linolenic acid was most effective in reducing the swelling phenomenon. Fish on diets without linolenic acids showed an increased liver respiration rate, a slightly lower Hb content and increased muscle water.--Copyright 1972, Biological Abstracts, Inc. (See also W73-00062 and W73-00064.
W73-00063

ESSENTIAL FATTY ACIDS IN THE DIET OF RAINBOW TROUT (SALMO GAIRDNERI): LIPID METABOLISM AND FATTY ACID COMPOSITION,
Oregon State Univ., Corvallis. Dept. of Food Science and Technology.
J. D. Castell, D. J. Lee, and R. O. Sinnhuber.
J Nutr. Vol 102, No 1, p 93-99. 1972.
Identifiers: *Fish physiology, *Fish diets, Composition, Essential fatty acids, Lipids, Metabolism, *Trout.

The fatty composition of the liver, heart, kidney, brain and body lipids of fish fed either a fat-free diet or those containing known amounts of oleic, linoleic, or linolenic was determined. A fat-free diet or 1 containing oleic acid as a sole lipid source resulted in elevated levels of eicosatrienoic acid. Dietary linoleate and linolenate both depressed the triene levels. Dietary lipids affected the fatty acid composition of phospholipids to a greater degree than those in the neutral lipids. The demonstrated requirement for the linolenic acids by fish suggest that the phospholipid fraction be used as an index of essential fatty acid nutrition. Diets which produce a ratio value of 0.4 or less appear to be adequate in the linolenate series and fulfill the nutritional requirements of young fish as judged by growth and other physiological parameters.--Copyright 1972, Biological Abstracts, Inc. (See also W73-00062 and W73-00063)
W73-00064

ECO-PHYSIOLOGICAL STUDIES ON DESERT PLANTS: II. GERMINATION OF ZYGOPHYLLUM COCCINEUM L. SEEDS UNDER DIFFERENT CONDITIONS,
Cairo Univ., Giza (Egypt). Faculty of Science.
K. H. Batanouny, and H. Ziegler.
Oecologia (Berl). Vol 8, No 1, p 52-63. 1971. Illus.
Identifiers: Deserts, *Germination, Light, Moisture, Plant physiology, Salts, Seeds, Moisture stress, *Temperature, *Zygophyllum coccineum D.

Z. coccineum seeds were tested for germination under different conditions. They showed ability to germinate under a wide range of temperature from 10 to 35C. The maximum percentage of germination was 92.5, reached at 25C in darkness. Germination at alternating temperatures was lower than at 25C. Seeds failing to germinate at 4 and 40C showed high rate of germination when transferred to 25C in dark. Exposure of seeds to light during germination inhibited the rate and percentage of germination at all temperatures. The germination percentage in alternating light was higher than that in continuous light, but both were lower than the percentage in complete darkness. The radicle is longer in dark germinated seedlings than in light germinated ones. The optimal depth of sowing was found to be 1 cm. Such a depth has numerous advantages for the germinating seeds. These advantages include the protection of the seeds against the inhibitory effect of light and against the rapid desiccation of the superficial soil layer. The seeds were able to germinate under high moisture stress in the order of 20 atm. The increase of the moisture stress up to a level of 8 atm did not affect the germination percentage significantly. The presence of salts in the germination medium inhibited germination to an extent more than that due to moisture stress alone. Seeds failing to germinate in salt solutions with osmotic values higher than 12 atm were able to germinate when washed with water. The seeds of Z. coccineum have the ability to germinate under a wide variety of conditions. This represents an adaptation to the drastic prevailing conditions in the habitat of this plant.--Copyright 1972, Biological Abstracts, Inc.
W73-00176

THE EFFECT OF LOW OSMOTIC POTENTIAL ON PHOSPHATE UPTAKE AND METABOLISM BY BEETROOT DISCS,
Instituto Nacional de Tecnologia Agropecuaria, Castelar (Argentina). Centro Nacional de Investigaciones Agropecuarias.
For primary bibliographic entry see Field 03F.
W73-00318

IMPROVED THERMOCOUPLE PSYCHROMETER FOR THE MEASUREMENT OF PLANT AND SOIL WATER POTENTIAL: I. THERMOCOUPLE PSYCHROMETRY AND AN IMPROVED INSTRUMENT DESIGN,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Plant Industry.
For primary bibliographic entry see Field 07B.
W73-00327

BIOCHEMICAL EVALUATION OF SOME METHODS OF INCREASING PLANT DROUGHT RESISTANCE, (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Plant Physiology.
N. A. Satarova, and E. K. Tvorus.
S-Kh Biol. Vol 6, No 2, p 251-255. 1971. English summary.
Identifiers: *Drought resistance, *Plant physiology, Adenine, Drought, Kinetin, Metabolism, Methods, Nucleic acids, Plants, Proteins, Sowing, Sulfates, Synthesis, Temperature, Zinc.

Methods of the pre-sowing hardening to drought and stepwise temperature hardening are probably related to the regulation of adaptivity at the gene level. Plant treatment before drought with $ZnSO_4$, kinetin, or adenine increased plant resistance to adverse conditions. The effect of these chemicals is not homogeneous and they influence different links of metabolism. They also participate in the regulation of the nucleic acid metabolism by neutralizing nuclear activity and stimulating RNA and protein synthesis.--Copyright 1972, Biological Abstracts, Inc.
W73-00604

PHYSIOLOGICAL MECHANISM OF STRAIGHT AND FEEDBACK CONTROL IN THE SYSTEM OF PLANT WATER EXCHANGE (IN RUSSIAN),
Agrofizicheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
V. G. Karmanov, and S. N. Meleshchenko.
Fiziol Rast. Vol 18, No 5, p 959-965. 1971. Illus. English summary.
Identifiers: *Plant physiology, Control, Exchange, Feedback, Flow, Forces, Mechanisms, Plants.

The system of plant water exchange was studied as a closed system. Special attention was paid to phase correlations between the leaf turgor and the transpiration rate during the autooscillatory regime of water exchange. Physiological mechanisms of straight and feedback control between the maximum and minimum forces of water flows are discussed as well as models of transvacuolar and wall movement of water flows. On the basis of the data on phase correlations of the parameters of plant water exchange during the autooscillatory regime, straight and feedback control in the leaf tissue are supposed to be spatially uncoupled.--Copyright 1972, Biological Abstracts, Inc.
W73-00608

BIOCHEMICAL ACTIVITY OF MITOCHONDRIA AND ITS RELATION TO A CHANGED GERMINATING POWER OF LUPINE SEEDS DURING DRYING, (IN RUSSIAN),
Akademiya Navuk BSSR, Minsk. Inst. of Experimental Botany.
A. Z. Denisova, and V. I. Pyko.
Fiziol Rast. Vol 18, No 5, p 1016-1021. 1971. Illus. English summary.
Identifiers: Biochemical activity, Contraction, Cytochrome, Dehydrogenase, Drying, *Germination, *Lupine D, *Mitochondria, Reductase, Seeds, Succinate, Swelling, Temperature.

The effect of drying on the total activity of dehydrogenases in extracts, the activity of succinate dehydrogenase in mitochondria and the succinate-cytochrome-c-reductase system was studied in lupine seeds. Seeds lacking germinating power still had some activity of total dehydrogenases in the extracts and succinate dehydrogenase activity in the mitochondria; hence, changes in the vitality of seeds during drying can not be characterized by the activity of these enzymes. Drying the seeds at elevated temperatures affected the ability for swelling and contraction of the mitochondria and completely inactivated the succinate-cytochrome-c-reductase system. A loss of the seed germinating power after drying at elevated temperatures is concluded to be due to a damage of the lipoprotein membranes of subcellular structures.--Copyright 1972, Biological Abstracts, Inc.
W73-00614

COMPARATIVE SWINNING ABILITIES OF FED AND STARVED LARVAL LARGEMOUTH BASS (MICROPTERUS SALMOIDES),
Bureau of Sport Fisheries and Wildlife, Narragansett, R.I. Narragansett Marine Game Fish Research Lab.
G. C. Laurence.
J Fish Biol. Vol 4, No 1, p 73-78. 1972. Illus.
Identifiers: *Bass, Largemouth bass, *Micropterus-Salmoides, Swimming, Larvae.

Sustained swimming abilities of fed and starved larval M. salmoides were compared in the first wk after swimming initiation. Fed larvae improved to a sustained velocity of 4 cm/sec while starved larvae attained a velocity of only 1.5 cm/sec. Swimming behavior for fed and starved larvae was quantified for number of moves, average distance/move, and total distance for all moves in 1 min intervals. Fed larvae were always more active than starved larvae, although real differences

did not appear until the 4th day after swimming initiation.-oCopyright 1972, Biological Abstracts, Inc.
W73-00617

EFFECTS OF DIETARY LIPIDS ON GROWTH, FOOD CONVERSION, LIPID AND FATTY ACID COMPOSITION OF CHANNEL CATFISH,
Skidaway Inst. of Oceanography, Savannah, Ga.
R. R. Stickney, and J. W. Andrews.
J Nutr. Vol 102, No 2, p 249-258. 1972.
Identifiers: Catfish, *Channel catfish, Dietary lipids, *Fatty-Acids, Ictalurus-Punctatus, Linseed-D, *Lipids, Safflower-D oil.

Channel catfish (Ictalurus punctatus) fingerlings were reared in 1-m-diameter fiberglass tanks at 26 deg and fed 27 experimental diets differing in source of lipid. Duplicate groups of fish were fed each of 8 primary lipid sources and each lipid was fed at a level of 10% of diets in 3 molecular forms; triglyceride, free fatty acid, and ethyl ester. Highest average weights occurred when the fish were supplemented with beef tallow, olive oil and menhaden oil triglycerides. Substantially lower gains were obtained from groups fed short- and medium-chain fatty acids, a fat-free diet, safflower oil (high in 18: 2 w 6) and linseed oil (high in 18:3 w 3). In general, triglyceride and ethyl ester diets led to more rapid growth of channel catfish than did free fatty acid diets. Food conversions for fish fed triglyceride diets were superior to those of fish on the other 2 dietary lipid types. The deposition of fatty acids in whole carcasses followed very closely the fatty acid composition of the diet whereas deviation from the dietary fatty acid composition was noted in liver.--Copyright 1972, Biological Abstracts, Inc.
W73-00620

FLOODING TOLERANCE OF FALL PANICUM AND TEXAS PANICUM,
Alabama Agricultural Experiment Station, Auburn.
C. S. Hoveland, and G. A. Buchanan.
Weed Sci. Vol 20, No 1: p 1-3. 1972. Illus.
Identifiers: *Fall panicum, *Flooding tolerance, Panicum-Dichotomiflorum-M, Panicum-M, Panicum-Texanum-M, Root, *Texas panicum.

Fall panicum (Panicum dichotomiflorum Michx.) and Texas panicum (Panicum texanum Buckl.) were grown in the greenhouse under flooding treatments for 1 mo. Fall panicum was more tolerant of flooded soil than was Texas panicum. Root development of Texas panicum was reduced by 50% under all flooding treatments. Herbage and root growth of fall panicum with flooding was similar to that on well-drained soil. Fall panicum root diameter was greater than that of Texas panicum, but both species increased under flooding. Tolerance of fall panicum to flooding may partially explain why it competes so well with crop plants during wet periods.--Copyright 1972, Biological Abstracts, Inc.
W73-00646

2J. Erosion and Sedimentation

THE DISSOLVED AND SOLID LOAD CARRIED BY SOME WEST AFRICAN RIVERS: SENEGAL, NIGER, BENUE AND SHARI,
Cambridge Univ. (England). Dept of Gepgraphy.
For primary bibliographic entry see Field 02K.
W73-00017

THE SIZE DISTRIBUTION OF PARTICLES IN THE OCEAN,
Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.
R. W. Sheldon, A. Prakash, and W. H. Sutcliffe, Jr.
Limnology and Oceanography, Vol 17, No 3, p 327-340, May 1972. 13 fig, 42 ref.

Descriptors: *Particle size, Oceans, *Distribution patterns, Oceanography, Suspended load, Variability, Depth, Suspended solids, Sea water, Sampling, *Pacific Ocean, *Atlantic Ocean.

Frequency distributions of particle size between size of about 1 and 100 microns are given for both surface and deep water of the Atlantic and Pacific Oceans. The form of the size spectra varies predictably both geographically and with depth. A hypothesis suggests that, to a first approximation, roughly equal concentrations of material occur at all particle sizes within the range from 1 micron to about 1 m, that is sizes of particles from bacteria to whales. (Knapp-USGS)
W73-00027

THE SPECTRUM OF PARTICULATE ORGANIC MATTER OF SHALLOW-BOTTOM BOUNDARY WATERS OF JAMAICA,
Yale Univ., New Haven, Conn. Dept. of Biology.
H. M. Reiswig.
Limnology and Oceanography, Vol 17, No 3, p 341-348, May 1972. 2 fig, 1 tab, 33 ref.

Descriptors: *Organic matter, *Suspended solids, Oceans, *Sea water, Suspended load, Oceanography, Sampling, Nutrients, Water chemistry, Distribution patterns, Bottom sediments.
Identifiers: *Jamaica.

Samples of near-bottom shallow waters of Jamaica were analyzed for particulate matter by direct microscopy and for total particulate organic carbon (POC) by wet ashing. Aggregates comprise less than 5% of discrete particulate material and less than 0.5% of total POC. About 88% of POC is not accounted for by discrete particulate material. Parallel analyses of exhalant water samples from marine sponges indicate that about 35% of the missing POC is available to these filter feeders and is probably colloidal in nature. (Knapp-USGS)
W73-00028

TRANSPORT OF SOLID PARTICLES BY TURBULENT FLOWS,
N. A. Mikhailova.
Fluid Mechanics-Soviet Research, Vol 1, No 3, p 96-99, May-June 1972. 4 fig, 4 ref.

Descriptors: *Bottom sediments, *Sediment transport, *Flow, *Turbulent flow, *Sand waves, Roughness (Hydraulic), Scour, Turbidity, Velocity, Boundary processes, Fluctuations.
Identifiers: *USSR, Pulsation, Kinematics.

Solid particles transported by flow alter the boundary conditions of flow and significantly affect its kinematic structure. The presence of sand waves on a flow-scoured bottom gives rise to low-frequency pulsations, some of which carry the maximum energy in the spectrum of fluctuating velocity components. The character of the distribution curves of average and fluctuating velocity and turbidity components varies along a sand wave, preserving its shape stability. (Josefson-USGS)
W73-00037

HYDROGEOCHEMISTRY OF THE SURFACE WATERS OF THE MACKENZIE RIVER DRAINAGE BASIN, CANADA--II. THE CONTRIBUTION OF AMINO ACIDS, HYDROCARBONS AND CHLORINS TO THE BEAUFORT SEA BY THE MACKENZIE RIVER SYSTEM,
Calgary Univ. (Alberta). Exobiology Research Group.
For primary bibliographic entry see Field 02K.
W73-00125

RIVER REGIME: RESEARCH AND APPLICATION,
Hydraulics Research Station, Wallingford (England).
For primary bibliographic entry see Field 08B.
W73-00143

SUSPENDED SEDIMENTS OF THE AMU-DAR'YA RIVER AND THEIR IMPORTANCE IN IRRIGATION (VZVESHENNYYE NANOSY AMU-DAR'I I IKH IRRIGATSIONNOYE ZNACHENIYE),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
I. A. Klyukanova.
Izdatel'stvo 'Nauka', Moscow, 1971. 112 p.

Descriptors: *Sedimentation, *Sediments, *Suspended load, *Suspension, *Irrigation, Agriculture, Soils, Alluvium, Sediment distribution, Sediment discharge, Particle size, Deltas, Channels, Flood plains, Lakes, Bogs, Nutrients, Mineralogy, Chemical properties, Turbidity.
Identifiers: *USSR, *Amu-Dar'ya River, *Suspended sediments.

The composition and properties of suspended sediments and alluvial deposits laid down in 1963-66 in the Amu-Dar'ya River delta in Karakalpak ASSR are investigated for their importance in irrigated agriculture. Analytical dependencies are established between particle size and chemical properties of suspended sediments and principal genetic types of alluvial deposits. The relations obtained can be used to study the movement of nutrients with suspended sediments in irrigation water. (Josefson-USGS)
W73-00189

OASES OF EAST ANTARCTICA (OAZISY VOSTOCHNOY ANTARKTIDY),
Arkticheskii i Antarkticheskii Nauchno-Issledovatelskii Institut, Leningrad (USSR).
For primary bibliographic entry see Field 02C.
W73-00196

PRINCIPLES OF GEOMORPHOLOGICAL MAP CONSTRUCTION FOR GOLD PLACER EXPLORATION (BASED ON YAKUTSK REGION EXAMPLES),
Geological Survey, Yakutsk (USSR).
V. G. Miller.
Geomorphology, No 2, p 111-120, April-June 1970. 3 fig, 17 ref. (Translated from Geomorfologiya, No 2, p 35-47, April-June 1970).

Descriptors: *Geomorphology, *Geologic mapping, *Exploration, *Placer mining, *Gold, Erosion, Aggradation, Streams, Channels, Flood plains, Terraces (Geologic), Surfaces, Bedrock, Sediments, Glacial drift, Glaciers, Glaciation, Cryology, Glaciohydrology, Aerial photography.
Identifiers: *USSR, *Yakutsk ASSR, *Tin, *Tungsten, *Geomorphic agents, Thermokarst topography, Ore deposits, Alluvial plains, Mapping methods, Aerial photographs.

The analytical or genetic geomorphological mapping method is the most acceptable approach to exploration of gold and other placer deposits in the northeastern part of the USSR. Basic topographic features, identified by aerial photo interpretation of field work, are used as mapping units. For the geomorphological placer mapping legend proposed, five genetic types of topography are given: denudational, fluvial, cryogenic, glacial, and hydroglacial. Each type is described in terms of geomorphic agents and processes, including erosion and aggradation. The map also contains information on bedrock ore deposits and on gold, tin, and tungsten placer concentrations in the area. (Josefson-USGS)
W73-00197

GEOLOGICAL, GEOPHYSICAL, AND ENGINEERING INVESTIGATIONS OF THE LOVELAND BASIN LANDSLIDE, CLEAR CREEK COUNTY, COLORADO, 1963-65,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 08D.
W73-00206

DIRECT MEASUREMENTS AND COMPUTATIONS OF TOTAL SEDIMENT DISCHARGE,
Agricultural Research Service, Oxford, Miss.
A. J. Bowie, G. C. Bolton, and C. E. Murphree.
Transactions, American Society of Agricultural Engineers, Vol 15, No 1, p 91-93, Jan-Feb 1972. 6 fig, 1 tab, 12 ref.

Descriptors: *Sediment distribution, *Sediment discharge, *Sediment load, *Measurement, Sedimentation, Bed load, Field tests, Particle size, Suspended load, Grain sizes, Prototype tests, Suspended solids, Velocity, Mississippi, Sediment transport.
Identifiers: *Sediment sampling, Sediment concentration, Particle distribution, Sediment samplers, Agricultural Research Service, Einstein Procedure, Empirical equations, Test results.

To devise a more accurate method for measuring total load, in 1965, the U.S. Department of Agriculture Sedimentation Laboratory initiated a comprehensive study in Mississippi. In 4 yrs, 805 samples representing 650 cross-sectional samples were collected during 36 runoff events for flow depths from 0.35 to 3.50 ft, with average cross-sectional velocities ranging from 2 to 7 fps. Concentrations were measured by wet-sieving, visual accumulation tube, and ro-tap sieve. Control and normal sections were compared, the former constructed with steel sheet piling to permit sediment sampling at the flow boundary. Sediment concentrations measured simultaneously at each section showed no appreciable difference in fine materials (less than 0.062 mm), but for particle sizes greater than 0.062 mm, an amount 56% less was detected at the normal section. To compute total sediment transport, any procedure must give considerable weight to varied contributions of different grain sizes. Empirical equations used to compare total measured sediment load with computed load predicted sand transport rates too high for flow velocities below 4 fps and too low for velocities over 4.5 fps. (USBR)
W73-00319

INFLUENCE OF AQUATIC SEDIMENTS ON WATER QUALITY,
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 05C.
W73-00389

SOME SEISMIC MEASUREMENTS ON THE VIRGINIA COASTAL PLAIN,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center.
J. K. Costain, and E. S. Robinson.
Available from the National Technical Information Service as PB-212 604, $3.00 in paper copy, $0.95 in microfiche. Virginia Water Resources Research Center VPI-WRRC-Bull. 56, September 1972. 69 p, 18 fig, 3 tab, 10 ref. OWRR A-034-VA (3).

Descriptors: *Seismic studies, Coastal plains, Sediment-water interfaces, *Virginia, *Sediments, *Refractority.
Identifiers: Coastal plains sediments, *Sediment thickness.

Seismic reflection and refraction surveys were made on the eastern coastal plain of the United States near Franklin and Boykins, Virginia, to investigate the thickness of the coastal plain sediments. Seismic reflection data indicated a total thickness of 990 feet near Franklin, and 575 feet near Boykins. The thickness of the sediments as indicated by refraction data was less by 4% and 7% at Franklin and Boykins, respectively. Seismic reflections from the base of the unconsolidated sedimentary section were well-recorded at both locations. Computer analysis of the reflection data revealed additional reflections from within the sedimentary section which were not clearly evident on the field records. If proper attention is given to recording techniques in order to suppress the generation and recording of surface waves, the methods of modern explosion reflection seismology should provide an accurate means of measuring total sediment thickness, and delineating and following reflecting horizons within the sedimentary section.
W73-00543

THE MINERALOGY AND CHEMISTRY OF HIGH PLAINS PLAYA LAKE SOILS AND SEDIMENTS,
Texas Tech Univ., Lubbock. Water Resources Center.
For primary bibliographic entry see Field 02G.
W73-00544

TURBULENT TRANSFER CHARACTERISTICS OF SETTLING PHENOMENON,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulic and Water Power.
M. Bayazit.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Vol I, p 1-8 , 1972 (release date). 6 fig, 10 ref.

Descriptors: *Turbulence, *Sedimentation, *Settling basins, *Hydraulic models, *Settling velocity, Model studies, Desilting, Suspended load, Intakes.
Identifiers: *Turbulent transfer.

Experiments were carried out to determine the effect of entrance conditions on the suspension of grains in settling basins. Intensities of turbulence were measured by means of hot film probes. These intensities are related to Reynolds stresses and correlations of concentration and velocity fluctuations. Both fine screens and grids are very effective in reducing the intensity of turbulence. Two parallel rows of alternately ordered vertical bars are recommended for settling basins. The energy contained in the larger eddies and responsible for the suspension of grains is also reduced by the obstructions in the entrance. These results are obtained for low Reynolds numbers and small depths, and they must be checked for prototype conditions. (Knapp-USGS)
W73-00545

LONGITUDINAL DISTRIBUTION OF MATTERS SETTLING TO THE BED IN SETTLING BASINS,
Technical Univ. of Istanbul (Turkey). Dept. of Civil Engineering.
K. Cecen, and M. Sumer.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Vol I, p 9-16, 1972 (release date). 4 fig, 6 ref.

Descriptors: *Sedimentation, *Settling basins, *Desilting, Mathematical models, Numerical analysis, Dimensional analysis, Hydraulic models, Flumes, Suspended load.

The distribution of matter deposited along the bed of the settling basin is treated theoretically and experimentally. The mathematical model characterizes the distribution of matter in a turbulent open channel. A dimensional analysis was carried out. The distribution of sediment deposited along the bottom is expressed in the terms of dimensionless variables and parameters. Based on this analysis, a series of experiments were performed, using a basin model having regular traps on the bed along the flume. Under the condition of continuous entry of sediment into the basin, the amount of sediment deposited at the bed was determined with respect to the dimensionless settling velocity parameter. (Knapp-USGS)
W73-00546

SIMULATION TECHNIQUE FOR SUSPENDED AND BED LOAD FOR SILT EJECTOR,
Central Water and Power Research Station, Poona (India).
C. V. Gole, S. V. Chitale, and K. S. Rajagopalan.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Vol I, p 25-32, 1972 (release date). 3 fig, 1 tab, 3 ref.

Descriptors: *Desilting, *Canals, *Bed load, Separation techniques, Sediment control, Hydraulic models, Model studies, Flumes.
Identifiers: *Sediment ejectors, *India.

When river water is drawn into a canal at the diversion work, sediment is also taken. Such sediment in a canal is transported both in suspension and bed load. Arrangements for exclusion of sediment entering the canal are normally made at the diversion works. Quite often, however, sediment concentration in the canal could still be excessive. A device known as a sediment ejector consisting of a number of tunnels across the canal near the bottom can be provided for removal of the sediment-laden bottom water. Ejectors are common on several canal systems in India and have proved very successful. The East Kosi Main canal takes off upstream of the barrage constructed on the Kosi river in North Bihar and has a design capacity of 15,000 cfs. A model of the silt ejector for this canal was constructed and operated at the Central Water and Power Research Station, Poona, to study its performance. Discharge equivalent to 15,000 cfs was run in the ejector model. The efficiency of the ejector was measured, and could be increased from 35% to 50% by adopting a flatter ramp having a slope of 1/100. (Knapp-USGS)
W73-00547

TURBULENT DISPERSION OF SUSPENDED MATTERS IN A BROAD OPEN CHANNEL,
Technical Univ. of Istanbul (Turkey). Dept. of Civil Engineering.
M. Sumer.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Vol I, p 33-43, 1972 (release date). 29 ref.

Descriptors: *Mathematical models, *Sediment transport, *Dispersion, *Diffusion, *Suspended load, Turbulent flow, Open channel flow, *Sedimentation, Model studies, Mixing.
Identifiers: *Turbulent dispersion.

The transportation of suspended matter can be characterized by means of a one-dimensional diffusion equation. If the total amount of matter injected to the flow is transported as a suspension, the longitudinal dispersion of matter is characterized by a one-dimensional diffusion equation with respect to an axis moving with the mean flow velocity for large times. Using the perturbation technique, the concentration distribution can be expressed in the form of a definite integral. Substituting the concentration field into the equation of the dispersion coefficient, this coefficient is obtained in the form of a definite integral. In order to compute the integrals numerically, computer programs may be written and executed. The longitudinal dispersion coefficient for suspended matter is computed as a series expansion. (Knapp-USGS)
W73-00548

EXPERIMENTAL STUDIES OF THE INFLUENCE OF SOLID PARTICLES ON SOME TURBULENCE CHARACTERISTICS IN PIPES,
Technische Hochschule, Hanover (West Germany). Franzius-Institut fuer Grund- un Wasserbau.
For primary bibliographic entry see Field 08B.
W73-00549

CURRENT WITH TRANSPORT OF SOLIDS; THE DETERMINATION OF THE RELATIONSHIP BETWEEN ITS INTEGRAL PARAMETERS AND ITS POINT KINEMATIC CHARACTERISTICS (COURANT AVEC TRANSPORT SOLIDE: DETERMINATION DU RAPPORT ENTRE SES PARA METRES INTEGRAUX ET SES CARACTERISTIQUES CINEMATIQUES PONCTUELLES),
Moskovskii Inzhenerno-Stroitelnyi Institut (USSR).
For primary bibliographic entry see Field 08B.
W73-00550

PROCESS OF TRANSFER IN A TWO-PHASE TURBULENT FLOW AND VELOCITY PROFILE OF THE SOLID-LIQUID MIXTURE, (PROCESSUS DE TRANSFERT DANS UN ECOULEMENT TURBULENT BIPHASIQUE ET PROFIL DE VITESSES UNIVERSEL DU MELANGE SOLIDE-LIQUIDE),
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki, Leningrad (USSR).
M. V. Pechenkin.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Vol I, p 63-68, 1972 (release date). 3 fig, 1 ref.

Descriptors: *Turbulent flow, *Sediment transport, Suspended load, Bed load, Saltation, Turbulence, Traction, Transfer.

Experimental studies of the internal structure of turbulent suspension flow reveal variations in mass and momentum transfer. At flow velocities insuring transport of the suspended matter, the average and pulsating kinematic characteristics of the liquid and solid phase are found to differ but slightly. Therefore, the suspension flow is considered kinematically as a fictitious continuum with its properties varying over the depth. Mechanical friction between suspended particles is accounted for by introducing the apparent viscosity. This rheological characteristic is used for plotting the velocity profile of the solid-liquid mixture. (Knapp-USGS)
W73-00551

SEDIMENT-LADEN SUBMERGED HORIZONTAL JET,
Norges Tekniske Hoegskole, Trondheim. River and Harbor Lab.
T. Carstens, and Rao U. Mohan.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 135-144, 1972 (release date). 4 fig, 14 ref.

Descriptors: *Jets, *Sedimentation, *Path of pollutants, *Outlets, Diffusion, Dispersion, Outfall sewers.
Identifiers: *Sediment-laden jets.

Submerged horizontal jets carrying particles in suspension behave differently from homogeneous jets because of the fall-out of the particles. Gross features of such jets are compared with the characteristics of jets with dissolved matter and momentum jets. Mathematical relations are proposed based on experimental findings for the trajectory of the jet and velocity decay along its axis. A procedure is indicated to determine the location of the crest of the sedimentation pattern on a horizontal plane. (Knapp-USGS)
W73-00560

CURRENTS INDUCED IN WATER BY SETTLING SOLIDS,
Manchester Univ., (England).
D. M. McDowell.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 191-198, 1972 (release date). 4 fig, 1 ref.

Descriptors: *Suspended load, *Turbidity, *Deposition (Sediments), *Momentum transfer, *Turbulence, Density, Settling velocity, Stratified flow, Mixing.

When a basin containing still water is connected to another in which sediment is in suspension due to turbulence, there will be a density difference between the two bodies of water. This will cause material to flow into the basin near the bed. The sediment will then settle towards the bed. A stationary sediment wedge can occur if the source of sediment in suspension remains unchanged. It is proposed that flow of sediment in the wedge will approximate to the product (settling velocity of particles times the length of wedge). A simple means of determining the length of wedge is given. This leads to an estimate of the rate of influx of sediment into the basin. (Knapp-USGS)
W73-00566

SEDIMENTATION AND FLUIDIZATION OF BEDS OF GRANULAR MATERIALS AND PARTICLES IN THE WATER (SEDIMENTATION ET FLUIDISATION DES COUCHES DE MATERIAUX GRANULEUX ET DES FLOCONS DANS L'EAU),
Vysoka Skola Dopravni, Zilina (Czechoslovakia).
For primary bibliographic entry see Field 08B.
W73-00576

SPECTRAL ANALYSIS APPLIED TO THE STUDY OF TIME SERIES FROM THE BEACH ENVIRONMENT,
Nottingham Univ. (England). Dept. of Geography.
C. A. M. King, and P. M. Mather.
Marine Geology, Vol 13, No 2, p 123-142, September 1972. 4 fig, 5 tab, 18 ref.

Descriptors: *Time series analysis, *Beaches, *Sediment transport, *Beach erosion, *Tidal effects, Surf, Waves (Water), Littoral drift, Frequency analysis, Sedimentary structures, Data processing, Statistics.
Identifiers: *Specural analysis.

Spectral and cross-spectral analysis were applied to two time series of beach data. The first series consisted of seven variables recorded at four-hourly intervals (with hourly value interpolated) and the second of four variables, recorded at high and low tide. In the first set, peaks in the spectrum at the semidiurnal tidal period were prominant for beach slope and breaker height, and in the second set for longshore current velocity, beach slope and sand size. Cross-spectral analysis gave coherence values for all possible pairs of variables; four notably high values occurred in the first set and three in the second. Semidiurnal and diurnal tidal cycle is important in both process variables and the beach slope response variable. A strong coherence between beach slope, sand and size and longshore current velocity shows that they are all affected by the tidal cycle. (Knapp-USGS)
W73-00586

WATER EROSION OF SOILS AND THE EFFECT OF EROSION CONTROL ELEMENTS IN THE VOLGA UPLAND (IN RUSSIAN),
For primary bibliographic entry see Field 04D.
W73-00589

PSEUDOMEANDERS AND POINT DUNES-- A FLUME STUDY,
Simon Fraser Univ., Burnaby (British Columbia). Dept. of Geography.
For primary bibliographic entry see Field 02E.
W73-00590

BEDROCK MORPHOLOGY AND STRUCTURES WITHIN OVERLYING SEDIMENTS, START BAY, SOUTHWEST ENGLAND, DETERMINED BY CONTINUOUS SEISMIC PROFILING, SIDE-SCAN SONAR, AND CORE SAMPLING,
Unit of Coastal Sedimentation, Taunton (England).
For primary bibliographic entry see Field 02L.
W73-00596

BED SHEAR STRESSES AND THE SEDIMENTATION OF SANDY GRAVELS,
Unit of Coastal Sedimentation, Taunton (England).
K. R. Dyer.
Marine Geology, Vol 13, No 2, p M31-M36, September 1972. 3 fig, 10 ref.

Descriptors: *Sediment transport, *Bottom sediments, *Gravels, *Sands, *Tidal streams, Sedimentation, Sands, Estuaries, Tidal waters, Currents (Water), Sand waves, Tidal effects.
Identifiers: *Solent (England).

Variations in bed shear stress between the crests and troughs of gravel waves may be the cause of simultaneous deposition of sand and gravel. Coupled with spatial variations in gravel wave steepness, this can produce spatial variations in the proportions of sand and gravel in seabed sediment. The channel of the West Solent, England, is floored by asymmetrical and symmetrical gravel waves which have heights of 1/4 m to 2 m and wavelengths of 5 m-18 m. The symmetrical waves generally have larger amplitude to wavelength ratios than asymmetrical ones. Where the ratio of crest shear to trough shear exceeds 4 the sands are moving mainly as bedload. This should occur where gravel waves have the greatest steepness. In this case the steep waves are the symmetrical waves. Mixed sandy-gravel sediment is formed by gravel being mobile on the gravel wave crest at the same time as sand is mobile in the trough. The gravel particles moved off the crest will be swept into the trough, where, if the sand is moving in suspension, the gravel particles will pass through and form an intact lattice. If the sand is moving mainly as bedload in the trough, the gravel particles will trap the sand between them and the gravel lattice will be open. (Knapp-USGS)
W73-00597

EOLIAN DUST ALONG THE EASTERN MARGINS OF THE ATLANTIC OCEAN,
Liverpool Univ. (England). Dept. of Oceanography.
R. Chester, H. Elderfield, J. J. Griffin, L. R. Johnson, and R. C. Padgham.
Marine Geology, Vol 13, No 2, p 91-105, September 1972. 2 fig, 4 tab, 26 ref. EPA Grant AP00672-04.

Descriptors: *Dusts, *Clays, *Sedimentation, *Atlantic Ocean, *Provenance, Sediment transport, Fallout, Winds, Soil erosion, Sampling, Clay minerals, Mineralogy.

Eolian dust was collected from the marine atmosphere of the major wind systems along the eastern margins of the Atlantic Ocean between c. 27 deg N and c. 34 deg S. The dust-loadings reflect the soil characteristics and local meteorological conditions of the adjacent land masses. The Sahara Desert in West Africa has a much greater effect on the dust content of the northeast trades than the Namib Desert of Southwest Africa has on the dust content of the southeast trades. The clay

mineralogy of the dusts was compared to those of source-area soils and deep-sea sediments. Several important trends were established: chlorite has only a small variation with latitude; illite decreases towards low latitudes; kaolinite increases in equatorial areas; no specific trends are apparent in the distribution of montmorillonite. The distribution of chlorite, illite and kaolinite in the dusts is similar to that in deep-sea sediments, and reflects the soil clay mineralogy of the adjacent land areas. Eolian dust falling out from the northeast trades can make a significant contribution to the land-derived suspended material in the upper layers of the underlying sea water. However, fallout from the major winds in the South Atlantic Ocean makes up much less than 1% of the total land-derived material in the underlying waters. (Knapp-USGS)
W73-00598

CATION EXCHANGE CAPACITY OF SUSPENDED MATERIAL FROM COASTAL SEA WATER OFF CENTRAL CALIFORNIA,
California Univ., Berkeley. Inst. of Marine Resources.
For primary bibliographic entry see Field 02K.
W73-00599

HEATHER BURNING AND SOIL EROSION ON THE NORTH YORKSHIRE MOORS,
Hull Univ. (England). Dept. of Geography.
A. C. Imeson.
J Appl Ecol. Vol 8, No 2, p 537-542. 1971. Illus.
Identifiers: Calluna-D, England, Erosion, *Heather-D, *Soil erosion, Vegetation, *Yorkshire moors.

Measurements of soil erosion beneath Calluna in various stages of growth are described. Where Calluna is recolonizing burnt ground and forms an incomplete cover, the rate of soil erosion correlates negatively with the height and density of the vegetation. Any loss of soil occurring where Calluna forms a complete canopy is very small compared to the rate of litter accumulation. Gully development on Calluna moorland is considered to occur in response to wetter soil conditions brought about by moor-burning.--Copyright 1972, Biological Abstracts, Inc.
W73-00621

2K. Chemical Processes

THE DISSOLVED AND SOLID LOAD CARRIED BY SOME WEST AFRICAN RIVERS: SENEGAL, NIGER, BENUE AND SHARI,
Cambridge Univ. (England). Dept of Gepgraphy.
A. T. Grove.
Journal of Hydrology, Vol 16, No 4, p 277-300, August 1972. 9 fig, 9 tab, 25 ref.

Descriptors: *Sediment load, *Rivers, *Africa, *Dissolved solids, Sampling, Water analysis, Water chemistry, Provenance, Solutes, Bed load, Suspended load, Humid areas.
Identifiers: Senegal River, Niger River, Benue River, Shari River.

Conductivity, pH and bicarbonate content of the water were measured at a number of points along the course of the Senegal, Niger, Benue and Shari rivers in Africa. Samples of water were preserved and sent to England for further analysis. The rivers have a number of common characteristics. They all rise at altitudes of 1000-2000 m on dissected plateaus and highlands between 6 deg and 12 deg north of the equator, where the rainfall is in excess of 1500 mm. Only a very small part of their discharge is derived from the extensive parts of their basins where the rainfall is less than 750 mm. Material in solution is supplied in large part by rain containing dissolved substances. The part of the dissolved and particulate load of west African rivers which originates neither from dust nor precipitation is probably derived from quite small parts of their catchments. The dissolved load is probably acquired very largely from regions with over 1500 mm of rainfall that supply most of the runoff. The bed load is provided by quite small areas of high relief. Within the catchment of the Niger, sediment and dissolved load are precipitated in the Inland Delta and this probably explains the low rates of erosion per square mile calculated for the Niger basin as compared with the Benue and Amazon. Another factor of importance is the large proportion of the Niger basin mapped as being within the catchment of the river but in fact so rainless that the yield of both water and sediment is very small. (Knapp-USGS)
W73-00017

COMMENTS ON THE USE OF A CALCIUM HARDNESS VARIABILITY INDEX IN THE STUDY OF CARBONATE AQUIFERS: WITH REFERENCE TO THE CENTRAL PENNINES, ENGLAND,
University Coll. of Swansea (Wales). Dept. of Geography.
J. L. Ternan.
Journal of Hydrology, Vol 16, No 4, p 317-321, August 1972. 1 fig, 11 ref.

Descriptors: *Karst hydrology, *Hardness (Water), *Water chemistry, *Variability, Hydrogeology, Aquifer characteristics, Sinks, Water circulation, Calcium carbonate, Limestones, Subsurface drainage.
Identifiers: *Pennines (England).

Temporal variations in the dissolved calcium carbonate concentrations of limestone springs in part of the Central Pennines of England provide an index both of the rate of groundwater circulation in the carbonate aquifers and of the mode of recharge. Recharge through open sinks, with rapid passage of water through the limestone, is associated with high variability in calcium hardness. By contrast water circulation in aquifers receiving recharge from diffuse percolation is of a much slower rate and is characterized by a lower degree of variation in calcium hardness and a more intimate contact between circulating water and bedrock. (Knapp-USGS)
W73-00020

BARIUM AND STRONTIUM IN GROUNDWATERS OF MESOZOIC-CENOZOIC SEDIMENTARY DEPOSITS IN THE CRIMEAN STEPPE ZONE (RASPROSTRANENIYE BARIYA I STRONTSIYA V PODZEMNYKH VODAKH MEZOKAYNOZOYSKIKH OTLOZHENIY STEPNOGO KRYMA),
Nauchno-Issledovatelskii Institut Prirodnykh Gazov, Kharkov (USSR).
A. S. Terdovidov, and N. Ye. Chupis.
Geokhimiya, No 11, p 1343-1352, November 1971. 1 fig, 1 tab, 4 ref.

Descriptors: *Geochemistry, *Groundwater, *Alkaline earth metals, *Strontium, *Sedimentary rocks, Sedimentary basins (Geologic), Aquifers, Geologic time, Mesozoic era, Cenozoic era, Water chemistry, Water types, Salinity, Sulfates, Grasslands.
Identifiers: *USSR, *Crimea, *Barium, Hydrogeochemistry, Cretaceous period, Paleocene epoch, Artesian basins, Mineralization.

Strontium in groundwater of Mesozoic-Cenozoic deposits of the Crimean steppe zone varies between 0.6 and 244.4 mg/liter. The barium concentration is low and varies between 0.1 and 19.4 mg/liter. There is a direct relation between strontium concentration and total salinity of groundwater and an inverse relation between barium and sulfate concentrations. High strontium concentrations (20-244 mg/liter) are found in waters of Lower Cretaceous deposits and can be used as criteria for defining boundaries of the Lower Cretaceous sedimentation basin. Practically no barium is found in sulfate groundwaters of Danian-Paleocene deposits of the northern Sivash artesian basin. (Josefson-USGS)
W73-00038

EFFECTS OF ACIDITY AND ALKALINITY OF GROUNDWATER ON CONCENTRATION AND MIGRATION OF RARE ELEMENTS (VLIYANIYE KISLOTNO-SHCHELOCHNYKH USLOVIY PODZEMNYKH VOD NA KONTSENTRATSIYU I MIGRATSIYU V NIKH REDKIKH ELEMENTOV),
All-Union Scientific Research Inst. of Hydrogeology and Engineering Geology, Moscow (USSR).
S. R. Kraynov.
Geokhimiya, No 11, p 1332-1342, November 1971. 2 fig, 1 tab, 21 ref.

Descriptors: *Geochemistry, *Groundwater, *Acidity, *Alkalinity, Water types, Water analysis, Cations, Anions, Metals, Physicochemical properties, Chemical properties, Chemical reactions.
Identifiers: *USSR, Hydrogeochemistry, Periodic table, Rare earths, Hydrolyzate elements, Ligands, Supergene.

Cation-forming elements (Li, Rb, Cs, etc.), complex-forming elements (Be, Ti, Nb, rare earths, etc.), and anion-forming elements (W, Ge, etc.) are investigated for their distribution and mobility in acid, near-neutral, and alkaline groundwaters. High concentrations of these elements are observed in acid and alkaline media. Occurrence of concentration peaks in different pH regions generally depends on the degree to which the elements form cations or anions. The greater mobility of cation- and anion-forming elements in groundwater attests to a relation between the capacity of rare elements to migrate in the earth's crust and their physicochemical properties and position in the periodic table. (Josefson-USGS)
W73-00039

WATER IN BIOLOGICAL SYSTEMS, VOL. 2.

Consultants Bureau: New York, N. Y.; London, England. 1971. 115 p, Paper. Pr. $15.00.
Identifiers: *Biological systems, Infrared radiation, Amino acids, Peptides, Proteins.

This volume comprises the translation of selected papers from vol. 1 and 2 of Struktura i Rol' Vody v Zhivom Organizme, the original Russian editions of which were published in 1966 and 1968, Leningrad University Press. The 21 papers presented in this volume include the following areas: concentration of water in various biological systems and its influence on IR absorption spectrum, various techniques utilized to investigate water in various aspects of biological systems, role of water in neuromuscular excitation, heat capacity of water and the relationship of water to amino acids, peptides and proteins.--Copyright 1972, Biological Abstracts, Inc.
W73-00083

CHEMISTRY OF POLAR SNOWS. ESTIMATION OF RATES OF DEPOSITION IN ANTARCTICA,
Centre National de la Recherche Scientifique, Grenoble (France). Laboratoire de Glaciologie.
C. Boutron, M. Echevin, and C. Lorius.
Geochimica et Cosmochimica Acta, Vol 36, No 9, p 1029-1041, September 1972. 5 fig, 8 tab, 29 ref.

Descriptors: *Water chemistry, *Antarctic, *Snow, *Trace elements, Fallout, Chlorine, Magnesium, Potassium, Calcium, Iron, Sodium, Manganese, Profiles, Sampling, Water analysis, Glaciation, Firn.

Analyses were made of chloride, sodium, magnesium, potassium, calcium, manganese and iron in ten surface firn samples collected along a profile from Mirny to Vostok, Antarctica, from the sea to a point 1295 km from the sea, at an altitude of 3420 m. The analyses were carried out by atomic adsorption after preconcentration in the presence of aqua regia and HF and neutron activation in the frozen state. Measured concentrations from 140 ppb for Cl to 0.1 ppb for Mn are in good agreement with those published recently for other Antarctic locations. Cl and Na concentrations decrease as the distance from the coast increases and then increase toward the central areas of Antarctica. Systematic variations were not found for the other elements. Except near the coast, concentrations could be related to a 'fractional' marine contribution, but a noticeable influence of a continental contribution could not be discarded. The annual elemental deposition rates decrease from the coast to Vostok. The fallout rates vary between 200,000 tons/yr for Cl and 300 tons/yr for Mn. (Knapp-USGS)
W73-00122

HYDROGEOCHEMISTRY OF THE SURFACE WATERS OF THE MACKENZIE RIVER DRAINAGE BASIN, CANADA--I. FACTORS CONTROLLING INORGANIC COMPOSITION,
Department of the Environment (Alberta). Inland Waters Branch.
S. W. Reeder, B. Hitchon, and A. A. Levinson.
Geochimica et Cosmochimica Acta, Vol 36, No 8, p 825-865, August 1972. 5 fig, 9 tab, 44 ref. NRC of Canada grant No. A-4383.

Descriptors: *Water chemistry, *Sampling, *Canada, *Water quality, *Trace elements, Hydrogeology, Surface-groundwater relationships, Leaching, Aqueous solutions, Mineralogy, Calcium, Magnesium, Strontium, Bicarbonates, Sulfates, Potassium, Sodium, Silica, Phosphates, Iron, Chlorides, Uranium radioisotopes, Nickel, Copper, Fluorides, Zinc, Boron, Geochemistry.
Identifiers: *Mackenzie River (Canada), Hydrogeochemistry.

The surface waters of the Mackenzie River drainage basin, Canada are virtually unpolluted. A suite of 101 surface waters was collected mainly during a three week period in the summer of 1969. Twenty two major and minor inorganic chemical components are reported, together with physical properties and documented details of the area and proportion of rock types in the sub-basins. Factor analysis demonstrates that three factors account, essentially equally, for nearly 96 percent of the information among the samples. They represent the influence of solution of evaporites and associated carbonate rocks, the influence of weathering products of calcareous marine shales, and the influence of weathering products of igneous and metamorphic rocks and non-calcereous shales. The main control on the inorganic composition of these surface waters is exerted by the bedrock encountered by the water during its residence in the sub-basins. The Mackenzie River, where it enters the delta, has contents of Li, B, and F which are close to suggested world average river composition, whereas the content of U is higher. Strontium is about four times the suggested world average, due mainly to abundant fossiliferous carbonate rocks, whereas SiO_2 is much less. The base metals Ni, Cu, and Zn are present at levels about one order of magnitude lower than suggested world averages. (See also W73-00125) (Knapp-USGS)
W73-00124

HYDROGEOCHEMISTRY OF THE SURFACE WATERS OF THE MACKENZIE RIVER DRAINAGE BASIN, CANADA--II. THE CONTRIBUTION OF AMINO ACIDS, HYDROCARBONS AND CHLORINS TO THE BEAUFORT SEA BY THE MACKENZIE RIVER SYSTEM,
Calgary Univ. (Alberta). Exobiology Research Group.
E. Peake, B. L. Baker, and G. W. Hodgson.
Geochimica et Cosmochimica Acta, Vol 36, No 8, p 867-883, August 1972. 5 fig, 7 tab, 34 ref.

Descriptors: *Water chemistry, *Organic matter, *Organic acids, *Deltas, Sediments, Gas chromatography, Geochemistry, Provenance, Water quality, Rivers.
Identifiers: *Mackenzie River (Canada), Hydrogeochemistry.

A major portion of the organic matter deposited on the continental shelf of the Beaufort Sea in the Canadian Arctic is from the drainage basin of the Mackenzie River. 101 samples of surface waters from the Mackenzie River drainage basin were collected in mid-summer of 1969. Sixteen amino acids were determined in selected samples using gas chromatography. The bulk of the acids were present in combined form in suspended particulate material. Suspended solid material contained 635 to 2260 micrograms per gram of total amino acids, corresponding to 15 to 220 micrograms per liter of river water. The principal pigments were uncomplexed pheophytins, about 80 percent of which appeared to be associated with the suspended sediment rather than in true solution. The amount of normal alkanes varied from a total of 0.5 micrograms per gram in a sample from a mountain stream to a total of 9.5 micrograms per gram in a shallow sediment. (See also W73-00124) (Knapp-USGS)
W73-00125

WATER CHEMISTRY OF THE AMAZON RIVER,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
R. J. Gibbs.
Geochimica et Cosmochimica Acta, Vol 36, No 9, p 1061-1066, September 1972. 2 fig, 3 tab, 8 ref.

Descriptors: *Water quality, *South America, *Dissolved solids, Sampling, Data collections, Variability, Water chemistry, Water analysis, Hydrologic data, Discharge (Water).
Identifiers: *Amazon River.

Seasonal-cycle sampling was used to compile water chemistry data of the Amazon River. A new calculation of 62 ppm for the mean dissolved salts concentration for South American rivers is 11 percent lower than previous calculations, and a new calculation of 117 ppm for the mean dissolved salts concentration for the rivers of the world is 2.6 percent lower than previous calculations. Over a yearly period the total salinity, HCO_3, Ca, Na, SO_4 and K of the Amazon varies in concentration by a factor of 2.2 to 3.4, whereas SiO_2, Mg and Cl are relatively constant throughout the seasonal cycle, with variation factors of 1.4 to 1.7. The variation factor of roughly 2 to 3 for the group of elements having varying concentrations through the year corresponds to the variation in the discharge of the Amazon during the year. (Knapp-USGS)
W73-00126

EARLY DIAGENESIS IN A REDUCING FJORD, SAANICH INLET, BRITISH COLUMBIA--I. CHEMICAL AND ISOTOPIC CHANGES IN MAJOR COMPONENTS OF INTERSTITIAL WATER,
California Univ., Los Angeles. Dept. of Geology.
For primary bibliographic entry see Field 05B.
W73-00127

ALUMINUM-SULFATE SPRINGS OF THE KIRGIZ SSR, (ALYUMOSUL'FATNYYE ISTOCHNIKI KIRGIZII),
Akademiya Nauk Kirgizskoi SSR, Frunze. Institut Neorganicheskoi i Fizicheskiy Khimii.
I. G. Druzhinin, B. I. Imanakunov, M. K. Kydynov, and A. K. Kalbayev.
Izdatel'stvo 'Ilim', Frunze, 1971. 148 p.

Descriptors: *Springs, *Sulfates, *Salts, *Metals, *Water chemistry, Water analysis, Chemical analysis, Analytical techniques, Sampling, Water sampling, Aqueous solutions, Solubility, Crystallization, Heteogeneity, Temperature, Equilibrium, Phase diagrams, Ions, Brines, Rocks, Isotherms.
Identifiers: *USSR, *Kirgiz SSR, Tungsten, Alum, Astrakanite, Mineralization.

This two-part monograph presents the results of investigations of highly mineralized natural waters in the southern part of the Kirgiz SSR. Aluminum-sulfate waters of the Republic are mineralized springs containing high concentrations of aluminum and sodium sulfates and low concentrations of nickel, manganese, copper, iron, tungsten, and other rare elements. A physicochemical investigation of heterogeneous systems consisting of aluminum, sodium, nickel, and ammonium sulfates at different temperatures is supported by data on the chemical composition of aluminum-sulfate waters of the Achik-Tash spring in the Lailyak Rayon of Osh Oblast. (Josefson-USGS)
W73-00190

SELECTED PHYSICAL AND CHEMICAL CHARACTERISTICS OF 20 CALIFORNIA LAKES,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 02H.
W73-00203

ACTIVITY STUDIES OF CHARGED AND UNCHARGED MOLECULES USING DETERGENT GEL MEMBRANE SYSTEMS,
Rome Univ. (Italy). Instituto di Farmacologia e Farmacognosia.
For primary bibliographic entry see Field 05A.
W73-00272

ATOMIC ABSORPTION DETERMINATION OF CHLORIDE UTILIZING THE BEILSTEIN TEST,
Iowa Univ., Iowa City. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-00274

BIPOLAR DIGIPOTENTIOGRATOR FOR ELECTROANALYTICAL USES. DIRECT CONVERSION OF CHARGE TO A DIGITAL NUMBER,
California Univ., Berkeley. Lawrence Berkeley Lab.
For primary bibliographic entry see Field 07B.
W73-00277

A MODIFICATION OF THE VARIAN HR-60 NMR SPECTROMETER PROBE FOR OPERATION AT VERY LOW TEMPERATURES,
California Univ., Berkeley. Dept. of Chemistry.
For primary bibliographic entry see Field 07B.
W73-00278

CHEMICAL IONIZATION MASS SPECTROMETRY,
Waterloo Univ. (Ontario). Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-00279

ARGON-WATER MIXTURES AS REAGENTS FOR CHEMICAL IONIZATION MASS SPECTROMETRY,
Virginia Univ., Charlottesville. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-00290

AUTOMATIC SPARK GAP CONTROL FOR SPARK SOURCE MASS SPECTROMETRY,
Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.

For primary bibliographic entry see Field 05A.
W73-00292

HIGHLY SELECTIVE AND SENSITIVE SPECTROPHOTOMETRIC DETERMINATION OF IRON (II) AND COBALT (III) WITH 4- (2--PYRIDYLAZO)RESORCINOL (PAR),
Hokkaido Univ., Sapporo (Japan). Lab. of Analytical Chemistry.
For primary bibliographic entry see Field 05A.
W73-00302

FACTORS AFFECTING THE USE OF A NON-DISPERSIVE SYSTEM FOR ATOMIC FLUORESCENCE FLAME SPECTROMETRY,
Florida State Univ., Tallahassee. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-00305

SIGNAL-TO-NOISE ENHANCEMENT THROUGH INSTRUMENTAL TECHNIQUES. PART I. SIGNALS, NOISE, AND S/N ENHANCEMENT IN THE FREQUENCY DOMAIN,
Indiana Univ., Bloomington. Dept. of Chemistry.
For primary bibliographic entry see Field 07B.
W73-00308

THE ROLE OF NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY AND MASS SPECTROMETRY IN WATER POLLUTION ANALYSIS,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
For primary bibliographic entry see Field 05A.
W73-00311

SPECTROPHOTOMETRIC INVESTIGATION OF ANALYTICALLY IMPORTANT METAL COMPLEXES,
Waterloo Univ., (Ontario). Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-00330

3-NITROSO-4-HYDROXYCOUMARIN AS INDICATOR FOR THE TITRATION OF IRON (III) WITH EDTA,
Hans Raj Coll., Delhi (India).
For primary bibliographic entry see Field 05A.
W73-00331

SIGNAL CONVERSION FOR THE AUTOMATION OF TITRATIONS,
Amsterdam Univ. (Netherlands). Naturkundig Laboratorium.
For primary bibliographic entry see Field 07B.
W73-00337

THE ATOMIC FLUORESCENCE CHARACTERISTICS AND DETERMINATION OF CHROMIUM IN AN ARGON-SEPARATED AIR--ACETYLENE FLAME,
Imperial Coll. of Science and Technology, London (England). Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-00351

ERRORS IN THE GRAN ADDITION METHOD. PART III. EXPERIMENTAL DETERMINATION OF ERRORS BY MEANS OF A FLUORIDE--SELECTIVE ELECTRODE,
Geneva Univ. (Switzerland). Dept. of Mineral and Analytical Chemistry Training.
For primary bibliographic entry see Field 07B.
W73-00353

THE ANODIC BEHAVIOUR OF ZINC IN AQUEOUS SOLUTION -- III. PASSIVATION IN MIXED KF--KOH SOLUTIONS,
Calvin Coll., Grand Rapids, Mich. Dept. of Chemistry.
For primary bibliographic entry see Field 05A.
W73-00359

SELECTIVITY STUDIES ON ANION-SELECTIVE MEMBRANE ELECTRODES,
Uppsala Univ. (Sweden). Medical Centre.
S. Back.
Analytical Chemistry, Vol 44, No 9, p 1696-1698, August 1972. 2 fig, 1 tab, 8 ref.

Descriptors: *Anions, *Anion exchange, Equipment, Ammonium compounds, Chemical reactions, Selectivity, Iodides, Mathematical studies, Zea potential, Electrochemistry.
Identifiers: *Membrane electrodes, *Selectivity ratios, Ion selective electrodes, Picrate, Tetrapropylammonium perchlorate, Tetra-butylammonium perchlorate, Chemical interference, Methylene chloride, pH meters, Sample preparation.

An anion-selective liquid membrane electrode, employing either tetra-propylammonium perchlorate (TPP) or tetra-butylammonium perchlorate (TBP) as an ion exchanger, was used for selectivity studies. Selectivity determinations, as calculated from mathematical expressions for selectivity ratios, were tabulated for the interfering ions, iodide or picrate. The quarternary ammonium compounds used as ion exchangers show the highest selectivity when the interfering ion is extractable; that is, when the extraction constant of perchlorate is of a lower order than picrate. The extraction constants are found to be in the sequence: picrate greater than perchlorate greater than iodide for the quartenary ammonium compounds. (Long-Battelle)
W73-00392

COLLABORATIVE STUDY OF THE DETERMINATION OF IRON AND ALUMINUM IN BAKING POWDER BY ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Food and Drug Administration, Brooklyn, N.Y.
For primary bibliographic entry see Field 05A.
W73-00405

COLLABORATIVE STUDY OF MICROANALYTICAL DETERMINATION OF BROMINE AND CHLORINE BY OXYGEN FLASK COMBUSTION,
Rutgers-The State Univ., Newark, N.J. Coll. of Arts and Sciences.
For primary bibliographic entry see Field 05A.
W73-00406

MICROCHEMICAL METHODS. COLLABORATIVE STUDY OF THE AUTOMATIC CARBON, HYDROGEN, AND NITROGEN DETERMINATION,
Agricultural Research Service, Philadelphia, Pa. Eastern Marketing and Nutrition Research Div.
For primary bibliographic entry see Field 05A.
W73-00408

ELABORATION AND INVESTIGATION OF SELECTIVE MEMBRANE ELECTRODES. COMMUNICATION 2. AN ELECTRODE WITH THE NITRATE FUNCTION,
Khimiko-Tekhnologicheskii Institut, Moscow (USSR).
For primary bibliographic entry see Field 05A.
W73-00437

STUDY AND USE OF A SELECTIVE ELECTRODE FOR THE POTENTIOMETRIC DETERMINATION OF FLUORINE (IN RUSSIAN),
For primary bibliographic entry see Field 05A.
W73-00438

SOILS IN THE FLOODPLAIN OF THE VYSSA RIVER (IN RUSSIAN),
For primary bibliographic entry see Field 02G.
W73-00491

POTASSIUM STATUS OF LEACHED CHERNOZEM IN THE KRASNODAR TERRITORY, (IN RUSSIAN),
For primary bibliographic entry see Field 02G.
W73-00499

CATION EXCHANGE CAPACITY OF SUSPENDED MATERIAL FROM COASTAL SEA WATER OFF CENTRAL CALIFORNIA,
California Univ., Berkeley. Inst. of Marine Resources.
R. C. Carter, and P. Wilde.
Marine Geology, Vol 13, No 2, p 107-122, September 1972. 4 fig, 5 tab, 43 ref.

Descriptors: *Cation exchange, *Suspended load, *Sea water, *Organic matter, Clays, Mineralogy, Water chemistry, Absorption, Adsorption, Dyes, Organic compounds.
Identifiers: *Methylene blue.

The methylene blue method for the determination of cation exchange capacity of suspended material in sea water is sensitive for values between 0.1 and 10.0 microequivalents per liter. Several nearshore sea water samples along the central California coastline contained 1 to more than 6 microequivalents per liter. At best this method gives an apparent CEC determined not only by organic, clay-organic, and clay particles, but also by methylene blue absorbed on the particles. Ease of sampling and rapidity of measurement make this method useful for approximation of the CEC of particulates in sea water, outweighing the uncertainties caused by the lack of detailed information on the absorptive and exchange behavior of organic particles in sea water. (Knapp-USGS)
W73-00599

RADIOISOTOPE X-RAY FLUORESCENCE SPECTROMETRY IN AQUATIC BIOLOGY: A REVIEW,
Fisheries Research Board of Canada, Nanaimo (British Columbia). Biological Station.
For primary bibliographic entry see Field 05A.
W73-00624

2L. Estuaries

THE EFFECT OF THE POWER PLANT THERMAL LOAD ON THE BAY OF NAANTALI,
Imatran Voima Osakeyhtio, Helsinki (Finland). Nuclear Power Project Group.
For primary bibliographic entry see Field 05C.
W73-00072

REMOTE SENSING OF THE CHESAPEAKE BAY.
For primary bibliographic entry see Field 05B.
W73-00101

AGRICULTURAL AND URBAN POLLUTION,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 05B.
W73-00105

ESTUARINE TURBIDITY, FLUSHING, SALINITY, AND CIRCULATION,
John Hopkins Univ., Baltimore, Md.
For primary bibliographic entry see Field 05B.
W73-00106

REMOTE SENSING AND EXTRACTABLE BIOLOGICAL RESOURCES,
Maryland Univ., College Park.
For primary bibliographic entry see Field 07B.
W73-00107

AGRICULTURE AND FORESTRY--IDENTIFICATION, VIGOR, AND DISEASE,
Smithsonian Institution, Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-00108

ENGINEERING WORKS AND THE TIDAL CHESAPEAKE,
Virginia Inst. of Marine Science, Gloucester Point.
W. J. Hargis, Jr.
In: Remote Sensing of the Chesapeake Bay; Proc of Conference held at Wallops Station, Virginia, April 5-7, 1971: National Aeronautics and Space Administration Special Publication, NASA SP-294, p 105-123, 1972. 5 fig, 12 ref.

Descriptors: *Remote sensing, *Chesapeake Bay, Engineering, Dams, Reservoirs, *Coastal engineering, Water management (Applied), Estuaries, Land management, Ecology, Geomorphology, Water pollution, Water pollution control.

The tidal tributaries of the ocean, the coastal areas of the mid-Atlantic Bight, and the ecological significance of engineering projects in them are discussed. The Chesapeake Bay drainage basin encompasses almost 65,000 square miles and provides space and resources for over 11 million people in New York, Pennsylvania, Maryland, Virginia, and the District of Columbia. Major residential, industrial and commercial, military, and recreational activities in the mid-Atlantic area make their demands on the environment and resources and contribute to the economic and social well-being of the populace. Population growth in the basin is increasing as are economic and social activities and other uses. Since much basic information about the environments and resources of the Chesapeake Bay region remains to be assimilated and adapted, basic and applied research and engineering development are needed. In situ and remote sensing from distant vantage points offer much to the researcher, planner, and manager interested in environments and resources. (See also W73-00101) (Knapp-USGS)
W73-00110

USE OF REMOTE SENSING IN SHORELINE AND NEAR-SHORE MANAGEMENT,
Maryland Dept. of Chesapeake Bay Affairs, Annapolis.
For primary bibliographic entry see Field 07B.
W73-00111

PROBLEMS OF URBAN DEVELOPMENT AND GROWTH,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07B.
W73-00112

CHESAPEAKE BAY STUDY,
Army Engineer District, Baltimore, Md.
W. J. Love.
In: Remote Sensing of the Chesapeake Bay; Proc of Conference held at Wallops Station, Virginia, April 5-7, 1971: National Aeronautics and Space Administration Special Publication, NASA SP-294, p 139-142, 1972.

Descriptors: *Chesapeake Bay, *Model studies, Data collections, Remote sensing, Water utilization, Water management (Applied), Land management, Estuaries, Regulation, Mathematical models.

Chesapeake Bay, one of the world's most productive estuaries, is situated in a rapidly expanding industrial and urban complex. Its location makes it more vulnerable to the adverse effects of man's work than any other estuarine system in the world. Saving it from severe damage by man requires a sound management program based on a firm foundation of expanding estuarine technology. The Chesapeake Bay study by the Army Corps of Engineers is a comprehensive estuarine study. This study is expected to yield significant knowledge of the interactions among many physical, chemical, biological, political, and social phenomena. The first objective is to provide an understanding of the existing physical, chemical, biological, economic, and environmental conditions of the Bay. The second objective is to define the attainable standards for the water-land resources. These standards will be formulated from the following criteria: economic efficiency, regional development, environmental quality, and the well being of the people. The third objective of the study is to provide a water-land management program for development, enhancement, conservation, preservation, and restoration of the Bay's resources. (See also W73-00101) (Knapp-USGS)
W73-00113

EARLY DIAGENESIS IN A REDUCING FJORD, SAANICH INLET, BRITISH COLUMBIA--I. CHEMICAL AND ISOTOPIC CHANGES IN MAJOR COMPONENTS OF INTERSTITIAL WATER,
California Univ., Los Angeles. Dept. of Geology.
For primary bibliographic entry see Field 05B.
W73-00127

ANOMALOUS OCCURRENCE OF CARP (CYPRINUS CARPIO) IN THE MARINE ENVIRONMENT,
Fisheries Research Board of Canada, Nanaimo (British Columbia). Biological Station.
W. E. Barraclough, and D. G. Robinson.
J Fish Res Board Can. Vol 28, No 9, p 1345-1347. 1971. Map.
Identifiers: *Fish migration, *British Columbia, Canada, *Carp, Cyprinus carpio, Environment, *Strait of Georgia (BC).

Juvenile C. carpio were caught with a surface trawl in low salinity surface waters of the Strait of Georgia, British Columbia, during July 1967. A natural environmental route is established for the possible movement of carp from the Fraser River estuary to watersheds on Vancouver Island.--Copyright 1972, Biological Abstracts, Inc.
W73-00191

STOCHASTIC MODEL OF BOD AND OD IN SEGMENTED ESTUARY,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
For primary bibliographic entry see Field 05B.
W73-00199

VELOCITY PROFILES AND DISPERSION IN ESTUARINE FLOW,
Arizona State Univ., Tempe. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W73-00200

USE OF CHESAPEAKE BAY FOR COOLING THERMAL-ELECTRIC POWER PLANTS; PART I: RESEARCH PRIORITIES; PART II: STATUS OF INFORMATION ABOUT CHESAPEAKE BAY AND SHORELINE,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
For primary bibliographic entry see Field 05B.
W73-00212

USE OF THE CHESAPEAKE BAY FOR COOLING THERMAL-ELECTRIC POWER PLANTS; PART III-RESEARCH AGENCIES AND INSTITUTIONS WORKING ON CHESAPEAKE BAY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
For primary bibliographic entry see Field 05B.
W73-00213

MODELING OF THERMAL DISCHARGES IN SHALLOW ESTUARIES,
Tracor, Inc., Austin, Tex. Ocean Sciences and Water Resources.
For primary bibliographic entry see Field 05B.
W73-00222

THE NETHERLANDS DELTAPROJECT: ITS ENVIRONMENTAL IMPACT,
Rijkswaterstaat-Deltadienst, The Hague (Netherlands).
Ir. P. Santema.
Water Spectrum, Vol 4, No 1, p 1-10, 1972. 2 fig, 1 map, 12 photo.

Descriptors: *Deltas, *Estuaries, *Water quality, *Environmental effects, Sea water, Aquatic habitats, Estuarine environment, Sediment transport, Sediment deposits, Salt water barriers, Vegetation effects, Fog, Beach erosion, Tidal effects, Sluice gates, Channel erosion, Birds.
Identifiers: Netherlands, Closures, Ice formation.

After extensive multidisciplinary studies, The Netherlands began work on the Deltaplan in 1958. Eight major structures will close tidal rivers and estuaries, and control strong tidal currents. Former estuaries may become fresh water basins; sediment transport and deposition patterns will be affected. The Deltaplan will cause drastic and abrupt changes in the deltaic area of the Rhine, Mense, and Scheldt Rivers. Changes are expected to aftect: (1) natural vegetation of tidal lands, causing a period of general impoverishment; (2) location and extent of birdlife refuges, having an impact on bird population of Western Europe; (3) patterns of currents in the coastal area, influencing sedimentation and erosion; (4) hydrobiology in new fresh water basins; (5) water chemistry of areas formerly flushed intermittently; (6) marine shipping practices for 130,000 vessels; and (7) thermal river loads, having a bearing on ice formation, night frost, and fog. Extensive environmental research will be performed over a 25-yr period. Supplementary or compensating features probably will be required before the project is considered complete. (USBR)
W73-00325

SILICA CONTENTS IN THE NORTHWESTERN FLORIDA GULF COAST,
Florida State Univ., Tallahassee. Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W73-00336

LIPID GEOCHEMISTRY OF A MISSISSIPPI COASTAL BOG ENVIRONMENT,
Louisiana State Univ., Baton Rouge.
J. R. Sever, T. F. Lytle, and P. Haug.
Contributions in Marine Science, Vol 16, p 149-161, March 1972. 3 fig, 4 tab, 20 ref.

Descriptors: *Chemical analysis, *Lipids, *Geochemistry, *Bogs, *Marine plants, *Coasts,

*Sediments, Solvent extractions, Drying, Gas chromatography, Pollutant identification, Organic compounds, Plant physiology, Alcohols, Filtration, Acidity, Mosses, Ferns, Aquatic soils, Clubmoss, Distillation.
Identifiers: Macrophytes, Sample preparation, Fatty acids, Mass spectra, Organic carbon, Aliphatic hydrocarbons, Glycerides, Saponification, Drosera rotundifolia, Spermatophytes, Bryophytes, Pteridophytes, Sphagnum affine, Lycopodium alopecuroides, Pteridium aquilinum, Rhynchospera oligantha, Xyris ambigua, Lachnocaulon anceps, Lachnanthes caroliniana, Sarracenia psittacina, Drosera rotundifolia, Drosera filiformis, Rhexia, Nyssa sylvatica, Osmunda, Drosera, Natural organics.

The lipid composition of a group of primitive higher plants, including mosses, clubmosses, ferns and flowerplants, from a Mississippi bog environment was investigated from an organic geochemical point of view. Representative plant and sediment samples were collected during major phenological peaks (June and August), and the lipid extracts were obtained by standard methods. Each lipid extract was saponified and the nonsaponifiable components removed by extracting the alkaline solution with benzene. The fatty acids were extracted into benzene after acidification with dilute HCl. The nonsaponifiable residue was then fractionated on a column into four parts: aliphatic hydrocarbons, alcohols, glycerides and lipids. The aliphatic hydrocarbons and fatty acid methyl ethers were identified and measured by gas chromatography and the mass spectra were obtained with a mass spectrometer. The organic carbon content of the sediment was determined by a combustion technique using a Leco gasometric carbon analyzer. Most of the plants growing in the bog environment had typical terrestrial plant hydrocarbon and fatty acid distributions. However, the following plants appeared to have unique distributions of both fatty acids and hydrocarbons: Sphagnum (moss), Lycopodium (clubmoss), Osmunda (fern), Drosera rotundifolia (flowering plant) and Nyssa (flowering plant). In this approach to implicate plants of a specific environment as the source of organic compounds, specifically hydrocarbons and fatty acids, found in sediments, good correlations were noted for sediment and plant hydrocarbons and fatty acids. (Byrd-Battelle)
W73-00340

ISOLATION OF CARBOHYDRATE-METABOLIZING, EXTREMELY HALOPHILIC BACTERIA,
Santa Clara Univ., Calif. Dept. of Biology.
For primary bibliographic entry see Field 05A.
W73-00341

PREDICTING THE EFFECT OF POLLUTION IN ESTUARIES,
Water Pollution Research Lab., Stevenage (England).
For primary bibliographic entry see Field 05C.
W73-00349

MARINE GAMMARIDEA (CRUSTACEA: AMPHIPODA) FROM THE INDIAN REGION. FAMILY AMPHITHOIDAE,
Kerala Univ., Trivandrum (India). Marine Biology Lab.
For primary bibliographic entry see Field 05A.
W73-00365

GONIADELLA GRACILIS, A POLYCHAETE NEW TO BRITISH SEAS,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
For primary bibliographic entry see Field 05A.
W73-00376

SEASONAL CHARACTERISTICS OF PHYTOPLANKTON IN THE AMURSKY BAY OF THE SEA OF JAPAN, (IN RUSSIAN),
Akademiya Nauk SSSR, Vladivostok. Institut Biologii.
For primary bibliographic entry see Field 05C.
W73-00442

PROGRAM PROSPECTUS FOR THE COASTAL RESOURCES MANAGEMENT COUNCIL.
Rhode Island Statewide Planning Program, Providence.
For primary bibliographic entry see Field 06B.
W73-00450

THE DELAWARE COASTAL ZONE ACT,
For primary bibliographic entry see Field 06E.
W73-00492

GULF INTRACOASTAL WATERWAY, CHOCOLATE BAYOU, TEXAS (NAVIGATION) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 08A.
W73-00512

SOME SEISMIC MEASUREMENTS ON THE VIRGINIA COASTAL PLAIN,
Virginia Polytechnic Inst. and State Univ., Blacksburg. Water Resources Research Center.
For primary bibliographic entry see Field 02J.
W73-00543

BEDROCK MORPHOLOGY AND STRUCTURES WITHIN OVERLYING SEDIMENTS, START BAY, SOUTHWEST ENGLAND, DETERMINED BY CONTINUOUS SEISMIC PROFILING, SIDE-SCAN SONAR, AND CORE SAMPLING,
Unit of Coastal Sedimentation, Taunton (England).
N. C. Kelland, and J. R. Hails.
Marine Geology, Vol 13, No 2, p M19-M26, September 1972. 4 fig, 3 ref.

Descriptors: *Sedimentation, *Seismic studies, *Stratigraphy, *Bays, Profiles, Bottom sediments, Geomorphology, Sedimentology, Surveys, Data collections, Hydrography.
Identifiers: *Start Bay (England).

The bedrock morphology of Start Bay, southwest England, and the structures within overlying sediments were determined by a combined geophysical and geological survey. The Skerries Bank consists of a drape of coarse, unconsolidated material overlying medium- to fine-grained silty sand. A break slope in the bedrock surface, traced along the entire length of the Bay, and a step profile in the southern part of the Bay, may be either a legacy of submerged topography produced by vigorous tidal action, or the product of subaerial and marine processes. Other significant geological features in the Bay include infilled valleys, and 'terraces' possibly pertaining to relict barrier beaches. (Knapp-USGS)
W73-00596

STUDIES ON THE BENTHIC COMMUNITIES IN SHIMIZU HARBOR AND ORIDO BAY IN SUMMER (IN JAPANESE),
Tokai Univ., Tokyo (Japan). Coll. of Marine Science and Technology.
For primary bibliographic entry see Field 05C.
W73-00632

03. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

DESALINATION,
Simon-Carves Ltd., Stockport (England).
A. Martindale, J. T. Allanson, and B. R. Parr.
U.S. Patent No 3,587,240, 4 p, 3 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 887, No 5, p 1437, June 28, 1971.

Descriptors: *Patents, *Desalination, Saline water, Sea water, *Crystallization, Water treatment, Water quality, Equipment.
Identifiers: *Ice crystals, *Liquid refrigerants.

A verticle baffle is mounted in a container and means are provided for injecting a volatile liquid refrigerant, which is immiscible with water, directly into the saline water. The refrigerant boils within the water and causes ice crystals to form. The boiling action causes continuous circulation of a slurry of ice crystals in turbulent flow around the baffle. The ice crystals are separated from the slurry and melted to produce desalinated water. (Sinha-OEIS)
W73-00516

METHOD FOR EVAPORATING BRINE,
G. L. Henderson.
U. S. Patent No. 3,586,090, 8 p, 19 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 887, No 4, p 1161, June 22, 1971.

Descriptors: *Patents, Water quality, *Brines, *Desalination, *Evaporation, *Heat transfer, Water treatment, Treatment, Sea water, Potable water.

The brine is passed downward as a flowing film over a heat transfer wall. On the opposite side of each wall, the heat transfer is maintained at a correspondingly high level by keeping the thickness of the condensate film within proper limits. This is done by means of traps provided on the condensate surface at properly spaced vertical intervals. A vapor collecting manifold is provided at the side edges of the heat exchange walls. A portion of the liquid is evaporated in at least one evaporation zone to precipitate a substantial amount of dissolved solid which is transferred to a separation zone. One evaporation zone is maintained at atmospheric pressure and a second is maintained at reduced pressure. (Sinha-OEIS)
W73-00520

HARD WATER TREATMENT,
Allied Chemical Corp., New York (assignee).
For primary bibliographic entry see Field 05F.
W73-00523

METHOD FOR WATER DISTILLATION,
W. A. Barnstead.
U. S. Patent No. 3,582,473, 3 p, 2 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 887, No 1, p 277, June 1, 1971.

Descriptors: *Patents, *Distillation, *Gases, Water quality, Water treatment, Condensation, *Water vapor, Separation techniques, Equipment, Treatment, Potable water.

A method of removing unwanted dissolved gases consists of applying heat to the impure water at a temperature above the boiling point of water at the ambient atmospheric pressure to change the impure water to vapor containing water vapor and

unwanted gases. These are passed to a condenser. The unwanted gas is vented to the atmosphere and the water vapor condensed into the liquid state. (Sinha-OEIS)
W73-00525

REVERSE OSMOSIS LIQUID PURIFICATION,
Aqua-Chem, Inc., Waukesha, Wis. (assignee).
George B. Clark.
U. S. Patent No. 3,581,900, 6 p, 10 fig, 10 ref; Official Gazette of the United States Patent Office, Vol 887, No 1, p 151, June 1, 1971.

Descriptors: *Patents, *Water purification, *Membranes, *Reverse osmosis, *Desalination, Brackish water, Salt water, Sea water, Saline water, Water quality, Fresh water, Potable water, Separation techniques, Water treatment, Treatment, Equipment.

An improved tubular membrane structure is provided for use in reverse osmosis liquid purification equipment. The porous, semirigid, thin-walled tube is factory lined on its internal surface with a suitable membrane. This membrane structure is received within one of the supporting tubes of a tube bundle, and the ends of the tube may be provided with a liquid impervious plastic coating or with plastic end ferrules. The outer surface of the thin-walled tube may be grooved to facilitate flow of product liquid to collecting manifolds. The supporting tube may be fabricated from aluminum, plastic or the like, and is bonded to the inner surface of the porous tube. (Sinha-OEIS)
W73-00526

INSTALLATION FOR THE TREATMENT OF WATER AND AQUEOUS SOLUTIONS,
Societe Grenobloise d'Etude et d'Applications Hydrauliques (France).
For primary bibliographic entry see Field 05F.
W73-00529

SEA WATER MULTISTAGE DISTILLATION PROCESS WITH COMMON REHEATING MEANS,
Commissariat a l'Energie Atomique, Paris (France). (assignee).
R. C. de Villiers, L. Blachez, F. Jegou, J. Huyghe, and P. Vignet.
U. S. Patent No. 3,580,818, 3 p, 4 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 886, No 4, p 922, May 25, 1971.

Descriptors: *Patents, *Desalination, *Distillation, Sea water, Saline water, Brackish water, Potable water, Fresh water, *Condensation, Pressure, Water quality, Treatment, *Flash distillation, Multistage flash distillation.

The process comprises a series of steps in which sea water is treated in a series of lines each consisting of reheating the sea water in the liquid state forming a preheated solution, causing its expansion in a series of stages to progressively decreasing pressures. Condensation of the vapor is caused at least in the recovery stages by exchange with the sea water feed solution. (Sinha-OEIS)
W73-00532

FLOATING, SEA WATER DISTILLATION APPARATUS USING A RECIRCULATING, DIRECTLY CONTACTING FLUENT HEATING MEDIUM,
H. S. Green.
U. S. Patent No. 3,580,814, 3 p, 11 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 886, No 4, p 921, May 25, 1971.

Descriptors: *Patents, *Desalination, *Distillation, *Evaporation, *Heat exchange, Sea water, Saline water, Brackish water, Fresh water, Potable water, Water treatment.

This apparatus is designed to float on sea water and allows for continuous operation. Sea water is evaporated by direct contact with heated oil discharged into an insulated heat exchange tube. The oil rises to the top of the water within the heat exchange tube for withdrawal by suction intake after transfer of its heat to the water. The evaporated water rises as a vapor through the steam stack to a condenser after passing through a steam trap. A pump connected to the suction intake recirculates the oil through a heater. (Sinha-OEIS)
W73-00533

DEIONIZATION PROCESS,
Ionics, Inc., Watertown, Mass. (assignee).
W. A. McRae, and W. E. Katz.
U. S. Patent No. 3,589,999, 5 p, 2 ref; Official Gazette of the United States Patent Office, Vol 887, No 6, p 2103, June 29, 1971.

Descriptors: *Patents, *Cation exchange, *Anion exchange, *Resins, Calcium, Carbonate, Carbon dioxide, Water treatment, *Potable water, Pollution abatement, Water pollution treatment.
Identifiers: *Deionization.

This deionization process employs beds of cation exchange and anion exchange resins in the alkaline earth and carbonate forms. Calcium and carbonate ions released from the resin during the deionization process precipitate out as insoluble calcium carbonate to yield an effluent of potable water. Regeneration of the resins back to their initial ionic form is accomplished in a mixed bed without the need of separating the resins. Regeneration is accomplished by contacting the bed with a lime slurry, rinsing free the unabsorbed calcium and hydroxide ions and then treating with CO2 to carbonate the anion resins. (Sinha-OEIS)
W73-00537

INVESTIGATION OF MEMBRANE STACK RESISTANCE INCREASE WITH A NATURAL BRACKISH WATER,
Bureau of Reclamation, Denver, Colo.
D. H. Furukawa.
Available from the National Technical Information Service as PB-207 656, $6.00 in paper copy, $0.95 in microfiche. Office of Saline Water, Research and Development Progress Report No 285, January 1968, 39 p, 7 fig, 7 tab, 10 ref, 3 append.

Descriptors: *Desalination, *Electrodialysis, *Descaling, *Brackish water, Demineralization.
Identifiers: *Membrane stack resistance, Electrodialysis demineralizers.

The operation of electrodialysis demineralizers on natural water has resulted in increases in membrane stack electrical resistance after extended periods. A primary resistance increase developes rapidly during the first hours of operation after which a secondary resistance increase occurs at a slower rate. The resistance increases are of great concern because of the increase in power consumption which contributes to a higher cost for product water. Laboratory investigations indicated that the major cause of the resistance increase is an accumulation of an iron-rich gel on membrane surfaces. The gel was observed chiefly on the dialysate side of cation membranes. A hypothetical mechanism for the formation of the iron-rich gel was postulated, which involved the reaction of ferrous ions in the feed water with hydroxide ions which form on the dissociation of water ('water splitting'). Sulfuric acid injected into the dilution stream eliminated the secondary resistance increase when the product acidity was lowered to pH 5.1. Using product pH 5.5 as the basis, the cost of sulfuric acid injection was about 2 cents/Kgal./1,000 ppm TDS removed for water of Dalpra Well No. 1 composition. However, because of a lower overall membrane stack electrical resistance, a savings in power consumption of 2.5 cents/Kgal./1,000 ppm TDS removed was obtained. Additional savings will be realized through more reliable operation with less maintenance and membrane replacement. (OSW abstract)
W73-00600

STUDY OF ELECTRICAL ANALOGUE FOR ELECTRODIALYSIS,
Douglas Aircraft Co., Inc., Newport Beach, Calif. Astropower Lab.
C. Berger, G. A. Guter, and G. Belfort.
Available from the National Technical Information Service as PB-207 655, $6.00 in paper copy, $0.95 in microfiche. Office of Saline Water, Research and Development Progress Report No 238, February 1967. 144 p, 39 fig, 20 tab, 32 ref, 4 append. 14-01-0001-676.

Descriptors: *Desalination, Electrodialysis, Equations, Electrochemistry.
Identifiers: *Electrolyte resistance, Ohmic polarization, Membrane potentials.

The objectives were to formulate a general mathematical equation for electrodialysis based on considering the process as an electrical network composed of resistive elements representative of various electrochemical processes and to apply the equation to specific situations and determine how variations in operating parameters and other variables influence performance and operating costs. When the equation was applied to the Webster, South Dakota and Buckeye, Arizona plants, the major resistive factors were electrolyte resistance, ohmic polarization (due primarily to scale) and membrane potentials. The minor resistive elements were electrode polarization, membrane resistance, and parasitic duct losses. The equation can be used to calculate the electrodialysis stack resistance and electrical operating costs if such operating parameters as water compositions, temperature, types of membranes, stack design, limiting current, operating current and flow rates are known. An empirical correlation was made between ohmic polarization, operating time and current density. (OSW abstract)
W73-00601

PARAMETRIC STUDY OF A ONE MGD BRACKISH WATER REVERSE OSMOSIS PLANT (SPIRAL WOUND CONCEPT),
General Dynamics Corp., San Diego, Calif. General Atomic Div.
H. F. Menzel.
Office of Saline Water Research and Development Progress Report No 236, February 1967. 82 p, 20 fig, 19 tab, 3 ref, 5 append. 14-01-0001-426.

Descriptors: *Desalination, *Desalination processes, *Reverse osmosis, Membranes, *Membrane processes, Economics, *Economic feasibility.

This report describes the results of a parametric economic study on a one million gallon per day spiral wound reverse osmosis plant desalting brackish water. It was assumed that the feed water is brackish water of various sodium chloride concentrations. Operating pressures were varied between 275 and 1440 psig. This study also investigated product water recoveries ranging from 50% to 90%. The following conclusions were reached: (1) The optimum system pressure is strongly dependent upon the membrane permeability and the membrane replacement costs but not in a feed water salt concentration range of 1,000 to 10,000 ppm. (2) Optimum water recovery for brackish water is a function of the feed water salinity. (3) The average capital costs, exclusive of module pressure vessel assembly cost, for a one mgpd brackish water plant are estimated at about $500,000. (4) Product water costs are strongly dependent upon membrane water fluxes and the membrane replacement costs. (OSW abstract)
W73-00602

A FEASIBILITY STUDY ON THE UTILIZATION OF WASTE BRINES FROM DESALINATION PLANTS, PART II,
Dow Chemical Co., Midland, Mich.
J. J. Christensen, W. F. McIlhenny, P. E. Muehlberg, and H. G. Smith.
Available from the National Technical Information Service as PB-206 288, $9.00 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report No 246, April 1967, 613 p, 31 tab. 14-01-001-392.

Descriptors: *Brines, *Desalination, *Dissolved solids, Desalination plants, Brine disposal, Feasibility, Water utilization.
Identifiers: Brine composition.

The data herein consists of computer printout sheets showing the dissolved solids content of 1552 natural brines occurring in the United States. Tables show the title element in descending order sorted according to states. Part I of this report (Research and Development Progress Report No. 245) contains the basic report on the technical and economical feasibility of recovering dissolved minerals in brines, with particular reference to brines discharged from saline water conversion plants. (OSW abstract)
W73-00603

PARAMETRIC COST STUDIES OF THE MULTISTAGE FLASH PROCESS,
Dynatech Corp., Cambridge, Mass.
F. DeWinter, S. E. Sadek, and J. M. Reynolds.
Available from the National Technical Information Service as PB-207 014, $6.00 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report 251, March 1967, 151 p, 62 fig, 11 tab, 18 ref, 4 append. 14-01-0001-681.

Descriptors: *Desalination, Desalination processes, *Flash distillation, Computer programs, Costs, *Cost analysis, Mathematical studies, Operating costs, Construction costs, Fixed costs.

A study of the effects of varying the steam, tubing, shell, pump and power, and water treatment and supply costs on an MSF plant design. Labor and fixed capital costs, other than the above, were estimated as 10 and 6.5 cents/1000 gal, respectively, and were assumed invariant with plant design. The optimization consisted of calculating water cost for a given set of input cost data while varying the plant parameters until a minimum water cost was obtained. For convenience, the effect of variations in pairs of the unit costs, while holding the other three constant, was investigated rather than allowing all five to vary independently. The computer program used is listed. (OSW abstract)
W73-00605

INVESTIGATION OF INORGANIC ION EXCHANGE MEMBRANES FOR ELECTRODIALYSIS APPLICATIONS,
Douglas Aircraft Co., Inc., Newport Beach, Calif. Astropower Lab.
G. A. Guter, and H. K. Bishop.
Available from the National Technical Information Service as PB-209 033, $11.75 in paper copy, $0.95 in microfiche. Office of Saline Water Research and Development Progress Report No 279, November 1967, 189 p, 34 fig, 46 tab, 45 ref. 14-01-0001-613.

Descriptors: *Membranes, *Ion exchange, *Electrodialysis, *Inorganic compounds, Anion exchange, Cation exchange, *Desalination.
Identifiers: *Inorganic membranes, *Ion selectivity, Zirconium phosphate, Transverse strength tests, Transport numbers, Mixed oxides, Ion pairs, Polarization, Membrane conductivity.

The mixed oxides of Groups III, IV, and V were investigated as selective ion exchangers for incorporation into electrodialysis membranes. Aluminum vanadate precipitated from acid solution demonstrated reversible cation exchange properties and, if precipitated from a basic solution, it demonstrated reversible anion exchange properties. Rigid membranes formed by pressing and sintering techniques had high cation and anion selective properties. Desalting experiments with these membranes in a small electrodialysis cell gave current efficiencies of 90%. Flexible membranes formed from aluminum vanadate exchangers using a number of organic binders and curing methods demonstrated only cation selectivity. The mechanical properties and ease of formation of the flexible membranes are especially suited for manufacture of large size membranes for electrodialysis plants. Electrodialysis experiments with these cation selective membranes demonstrated them to be 80 percent as efficient as commercial organic membranes. The transport number, t+, for the inorganic membranes were 0.85 to 0.90 and gave specific resistivities of 2000 ohm-cm (40 ohm-cm sq). The achievement of 80% of the performance of commercial membranes is considered excellent. (OSW abstract)
W73-00606

3B. Water Yield Improvement

COASTAL AND URBAN SURVEYS WITH IR,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 07B.
W73-00116

PROJECT FOG DROPS, PART II: LABORATORY INVESTIGATIONS,
Cornell Aeronautical Lab., Inc., Buffalo, N.Y.
For primary bibliographic entry see Field 02B.
W73-00123

CLOUD CHAMBER STUDY OF WATER EVAPORATION,
New Mexico State Univ., University Park. Water Resources Research Inst.
For primary bibliographic entry see Field 02D.
W73-00266

COMPREHENSIVE WATER RESOURCES STUDY OF THE GREENBREIR RIVER SUB--BASIN, VOLUME I--INVENTORY, 1968,
West Virginia Dept. of Natural Resources, Charleston. Div. of Water Resources.
For primary bibliographic entry see Field 06D.
W73-00456

STREAM FLOW CHARACTERISTICS OF: GREENBRIER RIVER SUB-BASIN,
West Virginia Dept. of Natural Resources, Charleston. Div. of Water Resources.
For primary bibliographic entry see Field 06D.
W73-00457

INTERBASIN TRANSFERS: NEBRASKA LAW AND LEGEND,
Florida State Univ., Tallahassee. School of Law.
For primary bibliographic entry see Field 04A.
W73-00475

3C. Use of Water of Impaired Quality

AGRICULTURAL AND AQUACULTURAL USES OF WASTE HEAT,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 05G.
W73-00069

THERMAL ADDITION - PLANNING FOR THE FUTURE,
White Fish Authority, West Kilbride (Scotland). Marine Fish Cultivation Unit.
For primary bibliographic entry see Field 05G.
W73-00082

NEW DATA ON UTILIZATION OF MINERALIZED GROUNDWATERS TO INCREASE SOIL PRODUCTIVITY (NOVYYE DANNYYE OB ISPOL'ZOVANII PODZEMNYKH MINERALIZOVANNYKH VOD DLYA POVYSHENIYA UROZHAYNOSTI POLEY),
Leningrad State Univ. (USSR).
I. N. Baskachenko, and M. I. Vrublevskiy.
Vestnik Leningradskogo Universiteta No 12, Seriya Geologiya i Geografiya, No 2, p 17-26, June 1971. 6 tab, 6 ref.

Descriptors: *Groundwater, *Salinity, *Salts, *Soils, *Productivity, Fertility, Crop production, Crop response, Plant growth, Growth stages, Root development, Photosynthesis, Trace elements, Nutrient requirements, Fertilization, Irrigation effects, Irrigation water, Freshwater, Moisture availability, Economics.
Identifiers: *USSR, *European USSR, *Mineralization, Artesian basins, Topdressing.

Utilization of mineralized groundwaters to increase the fertility level of soils on fields and meadows in northwestern regions of the USSR, Belorussia, and Baltic States was investigated in relation to the use of fresh water for irrigation. The use of mineralized groundwaters for irrigation affects plant growth by intensifying root development, increasing leaf area, and reducing the time required for flowering by 5-6 days and the seed maturation period by 7-10 days. Providing conditions are favorable, mineralized groundwaters can be used for irrigation and fertilization in areas with normal and, in some instances, limited moisture supplies. (Josefson-USGS)
W73-00192

LONG-TERM EFFECTS OF SALINE IRRIGATION WATER ON SATURATION EXTRACT DETERMINATION OF A CLAY SOIL IN THE LOCKYER VALLEY, QUEENSLAND,
Queensland Agricultural Coll., Lawes (Australia).
For primary bibliographic entry see Field 02G.
W73-00221

INTERACTION EFFECTS OF SALINITY OF THE SOIL AND NITROGEN FERTILIZER ON WHEAT OF GRAIN AND PROTEIN,
Ministry of Agriculture, Alexandria (Egypt). Dept. of Soils.
M. A. Barakat, S. I. Fakhry, and M. A. M. Khalil.
UAR J Soil Sci, Vol 10, No 2, p 169-185. 1970. Illus.
Identifiers: Fertilizers, Grain, *Nitrogen, Protein, *Salinity, Soils, *Wheat-M, Crop yield, Saline soils.

In a pot experiment, levels of salinity 200, 3000 and 6000 ppm of Na and Ca chlorides 1:1 by weight were tested on a clay and loam soil on which a 145 'Giza' cultivar of wheat was grown to maturity. Two rates of N fertilizer, 1.0 and 2.0 gN/drum, each split into 2,3,4 and 5 applications were given successively after irrigations. Yields of grain and straw and protein content of the grains were recorded and statistically analyzed. Salinity up to 6000 ppm in the saturation extract of the soil depressed grain yield by only 10%. Other treatments tested had also significant effects on the grain yield but did not interact with salinity. Salinity and N fertilizers had significant effects on protein concentration in wheat grains but the other factors did not interact with salinity. Soil salinity up to 6000 ppm tended to increase the protein concentration of the grain slightly and had only a small negative effect on protein yield. Straw yield was a

more sensitive indicator of the effects of all the factors and their interactions. Soil salinity to 6000 ppm depressed vegetative growth much more than grain and protein. Prediction of salt tolerance from vegetative growth may be misleading. The effect of salinity on vegetative growth depended on soil texture and/or rate of N dressing, being greater in coarse than in fine textured soils. It was also greater at a lower than at a higher rate of N fertilizer and greatest in a poorly fertilized loamy soil.--Copyright 1972, Biological abstracts, Inc.
W73-00372

THE EFFECT OF RESTRICTED DRAINAGE ON THE YIELD OF THREE RICE VARIETIES,
M. A. Barakat, and S. I. Fakhry.
UAR J Soil Sci, Vol 10, No 1, p 95-106. 1970. Illus.
Identifiers: *Drainage, *Rice-M, *Crop yield, *Salinity.

In a lysimeter experiment 3 rice cultivars 'Nahda,' 'Arabi' and 'Agami,' were subjected after transplanting to periods of restricted drainage for 1, 3, 6, 9 and 12 days. Equal amounts of salinity tolerable water were given in irrigation after each of those periods. Yield of grain and straw, total salinity and CO3 + HCO3 in drainage water are reported. Yields of both grain and straw are influenced by the period of restricted drainage. Varietal behavior is different in that 'Nahda' gives maximum yield on the 6-day period of restricted drainage treatment. At both sides of this period yield is declined. Gain in yield may rise to 12.3%. 'Arabi' yield declines progressively with increasing the period of restricted drainage. Twenty percent reduction is expected by increasing this period from 1-3 days, and 45% by extending the period to 12 days. 'Agami' is indifferent to restricted drainage up to 12 days. Salinity and CO3 + HCO3 accumulate as the period of restricted drainage increased but the relationship is not a simple one. Both salinity and CO3 + HCO3 are engaged in affecting the yield according to cultivar. Other variables may be involved.--Copyright 1972, Biological Abstracts, Inc.
W73-00375

SOILS OF THE KANT DISTRICT, (IN RUSSIAN),
For primary bibliographic entry see Field 02G.
W73-00501

REAPONSE OF TOBACCO (NICOTIANA RUSTICA L.) TO BRACKISH WATER,
Government Tobacco Research Station, Farrukhabad (India).
Hari G. Singh, and R. P. Sharma.
Indian J Agric Sci. Vol 41, No 8: p 697-699. 1971.
Identifiers: *Brackish water, Leaf, Nicotiana-Rustica-D, *Tobacco-D, *Crop yield.

Irrigation of tobacco (Nicotiana rustica L.) crop with brackish water substantially increased the yield of cured leaf and dried stalk, and markedly improved the quality of leaf. Irrigation with artificial brackish water also increased the yield and improved the quality.--Copyright 1972, Biological Abstracts, Inc.
W73-00647

3D. Conservation in Domestic and Municipal Use

EXISTING AUTOMATION, CONTROL AND INTELLIGENCE SYSTEMS FOR METROPOLITAN WATER FACILITIES,
For primary bibliographic entry see Field 05D.
W73-00145

COMPUTER AND CONTROL EQUIPMENT.
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00146

CONTROL OF COMBINED SEWER OVERFLOWS IN MINNEAPOLIS-SAINT PAUL,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00147

TASK 3 - AN INVESTIGATION OF THE EVALUATION OF AUTOMATION AND CONTROL SCHEMES FOR COMBINED SEWER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00148

SOCIAL AND POLITICAL FEASIBILITY OF AUTOMATED URBAN WATER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00149

URBAN SIZE AND ITS RELATION TO NEED FOR AUTOMATION AND CONTROL,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00150

MODEL OF REAL-TIME AUTOMATION AND CONTROL SYSTEMS FOR COMBINED SEWERS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00151

GUIDELINES FOR THE CONSIDERATION OF AUTOMATION AND CONTROL SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00152

RESEARCH AND DEVELOPMENT NEEDS FOR METROPOLITAN WATER INTELLIGENCE SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00153

METROPOLITAN WATER INTELLIGENCE SYSTEM, COMPLETION REPORT. PHASE I.
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00154

METROPOLITAN INDUSTRIAL WATER USE,
American Society of Civil Engineers, New York.
L. S. Tucker, J. Millan, and W. W. Burt.
Available from the National Technical Information Service as PB-212 578, $3.00 in paper copy, $0.95 in microfiche. ASCE Urban Water Resources Research Program, Technical Memorandum No 16, May 1972. 45 p, 4 tab, 6 ref, 6 append. OWRR C-3142 (No 3693) (2).

Descriptors: *Industrial water, *Withdrawal, *Urbanization, Water demand, Water users, Water requirements, Water pollution sources, Water supply, Water policy.
Identifiers: *Metropolitan areas, Urban water resources.

Using State water withdrawals and parameters defining industrial activity, estimates were made of the total self-supplied industrial withdrawal in each Standard Metropolitan Statistical Area across the nation. Self-supplied SMSA industrial withdrawals (other than for thermoelectric power) in 1964 were at least 63% of the combined public plus self-supplied non-thermoelectric power industrial withdrawals in SMSA's. Public-controlled water supplies appear to account for a relatively small portion of the water withdrawn in metropolitan USA. The findings lead to the suggestion that at least half of the national water pollution problem originates in SMSA's, and to the conclusion that schemes for improving the management of water resources in metropolitan areas that do not take into account the significant role of private interests must be regarded as only partial potential remedies. There is a clear need for quantification of industrial water withdrawals and industrial wastewater volumes and effluent qualities in metropolitan areas, together with projections based on available estimates of parameters defining future industrial activity. Such an analysis might place the river basin as a planning entity into better perspective and the results of the analysis could have profound effects on emerging national water policies. (McPherson-ASCE)
W73-00260

HYDROLOGIC EFFECTS OF URBANIZATION IN THE UNITED STATES,
American Society of Civil Engineers, New York.
M. B. McPherson.
Available from the National Technical Information Service as PB-212 579, $3.00 in paper copy, $0.95 in microfiche. ASCE Urban Water Resources Research Program Technical Memorandum No 17, June 1972. 45 p, 9 tab, 153 ref. OWRR C-3142 (No 3693) (3).

Descriptors: *Hydrologic aspects, *Urbanization, *United States, International hydrological decade, Environmental effects, Climatic data, Water conservation, Water utilization, Flooding, Water pollution effects, Mining, Hydrologic budget.
Identifiers: *Hydrologic effects, *Urban water resources.

Distributed for the information of U.S. researchers, this is one of seven national case studies of the IHD/Unesco Subgroup on the Effects of Urbanization on the Hydrological Environment. Consistent with the format of the other Subgroup case studies, the topics treated include: urbanization indicators; character of precipitation; microscale climatic effects; major effects resulting from urban water resources facilities; projected impact of community-scale urban water conservation measures; water supply impact; flooding effects; pollution effects; effects of mining activities; effects of other water-body uses; and water balance inventories. Emphasis is on effects, to the extent that national and regional generalizations can be drawn. As for nearly all developed countries, a scarcity of information on urban hydrologic phenomena delimits quantification of urbanization effects. On the other hand, sufficient indications are available to make qualitative judgments on a broad range of such effects.
W73-00261

URBAN RUNOFF,
American Society of Civil Engineers, New York.
M. B. McPherson.
Available from the National Technical Information Service as PB-212 580, $3.00 in paper copy, $0.95 in microfiche. ASCE Urban Water Resources Research Program Technical Memorandum No 18, August 1972. 44 p, 3 fig, 2 tab, 121 ref. OWRR C-3142 (No 3693) (4).

Descriptors: *Storm runoff, *Urbanization, *Surface runoff, United States, International hydrological decade, Hydrologic aspects, Water pollution effects, Flooding, Flood damage, Flood plains,

Surface drainage, Storm drains, Storage capacity, Water conservation, Watershed management.
Identifiers: Urban water resources, Storm sewers.

Distributed for the information of U.S. researchers, this is a report on one of about ten selected special topics studied by the IHD/Unesco Subgroup on the Effects of Urbanization on the Hydrological Environment. Topics included are: the urban stormwater disposal physical subsystem; urban land-use changes; morphological changes in drainage; changes in flood characteristics; flood mitigation versus the amenities of drainage; some management possibilities; research and development needs; and some simulation considerations. Little of metropolitan land is not drastically altered by urbanization. Underground storm drainage systems replace mostly the smallest natural channels, facilitating human occupance by draining sheet-flow runoff from the land surface. Discharges from conventional storm drainage facilities and flood-plain intrusion of structures mutually tend to aggravate flooding. Runoff is a carrier of wastes, either as harvested for water supplies and converted to water-borne sewage or as an urban ground-surface ablution. Requirements for control of pollution from combined sewer overflows are rapidly becoming more stringent and the control of pollution caused by urban stormwater discharges is on the horizon. Increased use of in-system storage and multi-purpose drainage facilities is indicated, for water quality control, water conservation, and enhancement of recreational and aesthetic opportunities.
W73-00262

3E. Conservation in Industry

PLANNING FOR UNCERTAINTY: ENERGY IN THE YEARS 1975-2000,
Battelle Memorial Inst., Columbus, Ohio
M. J. Snyder, and C. Chilton.
Battelle Research Outlook, Vol 4, No 1, p 2-5, 1972. 1 fig.

Descriptors: *Projections, *Forecasting, *Electric power demand, *Electric power production, Powerplants, Thermal powerplants, Nuclear powerplants, *Thermal pollution, Natural gas, Oil, Fossil fuels, Energy budget, Planning, Reactors, Breeder reactors, Hydroelectric power, Fish, Temperature, Cooling, Cost-benefit analysis, Coal, Energy conversion, Energy transfer.
Identifiers: Carnot cycle, Solar energy.

Prospects of the energy picture in the years 1975-2000 are presented. Poorer, deeper and more remote reserves of oil, gas and coal will be exploited. While thermal power plants may still be enlarged and made more efficient, economics of scale are approaching a flattening out of the curve. Future energy supply must comply with ever-tightening and costly social and environmental constraints, such as the elimination or control of black lung disease, land abuse, oil spills, thermal pollution, sulfur oxide emissions, and ozone generation. The electric power industry will increasingly turn to nuclear energy, with breeder reactors likely, and fusion reactors much less likely, before the year 2000. The advent of the breeder will sound the death knell of coal as a major power-plant fuel. Coal will continue as a significant energy source, however, for conversion to cleaner liquid and gaseous fuels. (Oleszkiewicz-Vanderbilt)
W73-00080

THE LOW COST POWER MYTH,
Detroit Edison Co., Mich.
W. J. McCarthy, Jr., and R. L. DeMumbrum.
Chemical Engineering Progress, Vol. 68, No. 3, p 27-30, March 1972. 6 fig.

Descriptors: *Electric power, *Costs, Fossil fuels, Nuclear powerplants, Growth rates, Technology, Breeder reactors, Forecasting, Industries, Electric power demand.

Between 1940 and 1970 the cost of primary energy in the United States increased 125 percent, while the cost of electricity declined 18 percent. To predict the future cost of electric power the industry must estimate load growth, advances in power technology, and cost of fuels, money, labor and materials. The cost of electricity to large industrial customers is expected to double by the year 2000. The cost of fossil fuels will be 2.5 to 3 times the 1970 cost, while nuclear energy will decline slightly in cost. In the year 2000 the national load level will be six to seven times that of 1970. Nuclear technology, especially fast breeder reactors, and the further development of integrated electric power systems, hold the key to keeping power costs at a low level with a reliable and abundant supply of electric energy. (Upadhyaya-Vanderbilt)
W73-00085

THE PROMISE OF UNCONVENTIONAL ENERGY SOURCES,
Battelle Memorial Inst. Columbus, Ohio.
R. J. Anderson.
Battelle Research Outlook, Volume 4, Number 1, p 22-25, 1972. 3 fig.

Descriptors: *Electric power demand, *Thermal powerplants, *Energy, *Winds, *Solar radiation, *Tides, Geothermal studies, *Thermal pollution, Thermal springs, Fossil fuels, Electricity, Hydroelectric power.
Identifiers: *Unconventional energy sources, *Geothermal power, *Wind power, *Solar power, *Tidal power, Sun, Energy sources.

New sources of energy are discussed, drawing on resources different to a significant degree from fossil or nuclear fuels. Geothermal energy is being utilized or is planned for large scale utilization in New Zealand (Wairakei Geothermal Powerplant), Iceland, Japan, the USSR and Hungary. Geothermal exploration can provide only coarse estimates. The sun is regarded seriously as a resource to help solve the energy crisis. Wind power may never again be employed on the previous cale. The Virgin Islands pumping project described shows, however, that any source of energy can have its own area of useful application. Tide energy has caught attention and is utilized in several places. France's Rance project is encouraging new tidal projects in the years to come. (Oleszkiewicz-Vanderbilt)
W73-00088

COOLING WATER REQUIREMENTS FOR THE GROWING THERMAL GENERATION ADDITIONS OF THE ELECTRIC UTILITY INDUSTRY,
Westinghouse Electric Corp., East Pittsburgh, Pa. Power Systems Planning.
For primary bibliographic entry see Field 05G.
W73-00227

METROPOLITAN INDUSTRIAL WATER USE,
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 03D.
W73-00260

3F. Conservation in Agriculture

IRRIGATED CROPS ALONG THE NIGER RIVER: RESULTS OF SEVEN YEARS OF MEASUREMENT AND EXPERIMENTATION (1963--1970) AT THE AGRICULTURAL HYDRAULICS EXPERIMENTAL STATION OF TARNA IN THE GOULBI DE MARADI AREA. (IN FRENCH)
Tropical Testing Establishment (Nigeria).
J. Charoy.
Agron Trop Ser Agron Gen Etud Tech. Vol 26, No 9, p 979-1002. 1971. Illus. Map. English summary.
Identifiers: *Crop production, *Irrigation, Agriculture, Cotton D, Crops, Experimentation, Goulbi De Maradi, Hydraulics, Measurements, Niger River, Onion M, Sorghum M, Tomato D, Transpiration, Wheat M.

Results were given for irrigated crop experimentation and agroclimatological-bioclimatological data recording conducted at the Tarna Agricultural Hydraulics Experimental Station (Niger) from 1963-1970; the information obtained is to be used in planning or operating water resources development projects, particularly with regard to irrigation. A simple method was developed for estimating potential and maximal evapotranspiration and was applied to study of the water requirements of cultivated plants (cotton, tomatoes, onions, wheat, sorghum) and the influence of water rationing.--Copyright 1972, Biological Abstracts, Inc.
W73-00141

THE USE OF PLANT ANALYSES IN AGROCHEMICAL MAPPING OF IRRIGATED SOILS FOR COTTON,
I. M. Lipkind.
Tr Tadzh Nauchno-Issled Inst Pochvoved. Vol 13, No 2, p 260-267. 1970.
Identifiers: *Soil chemical properties, Analytical techniques, *Cotton D, *Fertilizers, Irrigated land, Mapping, *Nitrates, Nitrogen, Plants, Soils.

Numerous investigations have shown that the contents of P and K in cotton plants are not correlated with the presence of the mobile forms of these elements in the soil and cannot be used for the correction of soil maps. In contrast the N supply in soil can be assessed by the nitrate N found in the petioles of top leaves. On plots where the petioles of cotton leaves had 2.5 'points' of NO3 in Aug., the soil usually contained > 20 kg/ha nitrate N in spring, an amount fully adequate for the normal development of shoots. The autumn diagnosis by analysis of plants helps to determine the N dose for the next years' crop.--Copyright 1972, Biological Abstracts, Inc.
W73-00171

INTRODUCTORY CULTIVATION OF STROBILOID EPHEDRA (EPHEDRA STROBILACEA) IN THE DESERT PASTURES OF UZBEKISTAN,
Khorezmskii Pedagogicheskii Institut, Urgench (USSR).
R. Egamberdiev.
Rast Resur. Vol 7, No 3, p 372-379. 1971. Illus.
Identifiers: *Crop response, Cultivation, Desert, *Ephedra strobilacea G, Pastures, Sheep, USSR, Uzbekistan crop production.

Studies were undertaken in 1962-1964 on desert cultivation of strobiloid ephedra (E. strobilacea), an important fodder for the Karakul sheep. The studies were conducted in the Karnabchul desert in the Samarkand region. The rate of field germination during the winter season was 26-39%. The crop yield of the aerial portion of E. strobilacea was 6.9 g/h, on the average, during the 2nd yr. Optimal conditions for sowing were during Dec.-Jan. with approximately 4-6 kg of seed/ha, employing either a square cluster (45 x 75) method of planting or linear sowing with the rows 60 cm apart and the seeds at a depth of 2-4 cm. The data showed that E. strobilacea could be cultivated in the desert regions of Uzbekistan.--Copyright 1972, Biological Abstracts, Inc.
W73-00174

EFFECT OF THE WEATHER ON NITROGEN NUTRITION AND THE FORMATION OF THE YIELD OF WINTER WHEAT,
Ukrainskii Nauchno-Issledovatelskii Institut Rastenievodstva, Selektsii i Genetiki, Kharkov (USSR).

S. P. Brazhnik, Z. M. Kolesnikova, Y. A. Polesko, Y. V. Budennyi, and G. G. Shvets.
Agrokhimiya. 7. p 11-16. 1971. Illus.
Identifiers: *Crop production, Temperature, Ammonia, Fertilizers, Nitrates, Nitrogen, *Nitrogen-15, Weather, *Wheat, Winter.

In experiments conducted on vigorous slightly leached chernozem soil the yield of winter wheat grain correlates to a greater degree with temperature conditions than with the amount of rainfall over the growing period. In vegetation experiments in which N15 is used, the utilization by the plants of the N from nitrate fertilizers depends on temperature conditions to a greater degree than in the case of ammonia fertilizers.--Copyright 1972, Biological Abstracts, Inc.
W73-00175

SOME INDICES OF THE WATER BALANCE IN COTTON IN CONNECTION WITH THE ACTION OF ALUMINUM,
Uzbekskii Gosudarstvennyi Universitet, Samarkand (USSR).
S. S. Abaeva, K. R. Rovshanov, and T. L. Efremkina.
Biol Nauk. Vol 14, No 2, p 70-73. 1971. Illus.
Identifiers: *Soil-water-plant relationships, *Aluminum, Water balance, *Cotton-D, Fertilizers, Indices, Crop production.

The enrichment of plants with Al brings about an increase in the concentration of bound water in the leaves, an increase in the concentration of cell sap, and a drop in the transpiration rate in the midday hours. When Al is introduced into the soil at a rate of 1.2 kg/ha, the yield of cotton fiber is increased by 12%. When the seeds are soaked in a 0.1% solution of aluminum sulfate before sowing the cotton yield increases by 8%.--Copyright 1972, Biological Abstracts, Inc.
W73-00210

SOIL PROFILE GRAVEL LAYERS: II. EFFECT ON GROWTH AND WATER USE BY A HYBRID FORAGE SORGHUM,
Southwestern Great Plains Research Center, Bushland, Tex.
P. W. Unger.
Soil Sci Soc Am Proc. Vol 35, No 6, p 980-983. 1971. Illus.
Identifiers: Forage, *Gravel, Growth, Hybrid sorghum, Soil profiles, *Sorghum-M, Sorghum-Vulgare-M, Sorghum-Vulgare-Var-Sudanense-M.

Plant growth, dry-matter yield, soil water use, and water use efficiency were determined for a hybrid forage sorghum (Sorghum vulgare Pers. X Sorghum vulgare var. sudanense) growing in field plots having a gravel layer placed on or below the surface, and in check plots. The surface gravel layer resulted in higher yields of the first crop each year, but not of the second crop (plant regrowth). Subsurface gravel layers resulted in lower yields than the surface gravel layer, and for 3 of the 4 crops, lower than those on the check plots.--Copyright 1972, Biological Abstracts, Inc.
W73-00240

SOIL ASSOCIATIONS AND LAND CLASSIFICATION FOR IRRIGATION, SIERRA COUNTY,
New Mexico Agricultural Experiment Station, University Park.
H. J. Maker, J. M. Downs, and J. U. Anderson.
Available from the National Technical Information Service as PB-212 585, $3.00 in paper copy, $0.95 in microfiche. Agricultural Experiment Station Research Report 233, New Mexico State University, Las Cruces, New Mexico, 1972. 56 p, 7 fig, 7 tab, 6 ref. OWRR B-015-NMEX (20).

Descriptors: *New Mexico, *Irrigable land, *Soil classification, *Land classification, Soil investigations, Agriculture, Irrigation.
Identifiers: *Sierra County (NMex), *Soil associations, *Irrigation potential, Soil interpretation, Soil characteristics, Soil description.

Information is presented on the suitability of soils in Sierra County, New Mexico for irrigation. The acreage, general location, and relative capability of the soils for use in irrigated agriculture are given. A general soil map provided the information necessary for the classification for irrigation. The data were organized and presented on the basis of soil associations shown on the general soil map and on the irrigation land classification map. Sierra County has about 2,700,200 acres, of which about 23 percent were considered suitable for irrigation. About 24,993 acres were in irrigation class 1; 63,589 acres in class 2; 323,439 acres in class 3; and 205,966 acres in class 4. The remaining 2,082,213 acres in the county were in land class 6, which was not considered suitable for irrigation. Information is provided on soil resources that can be used for preliminary planning for irrigated agriculture, forestry, range, urban, engineering, recreation, and wildlife uses. A general soil map and a classification of land for irrigation map, both in color, are included. (Creel-New Mexico State)
W73-00267

A SIMPLE METHOD OF DRIP IRRIGATION,
Agronomics, Inc., Avondale, Ariz.
E. D. DeRemer.
Irrigation Journal, Vol 22, No 3, p 10-15, May-June 1972. 8 fig, 5 ref.

Descriptors: *Irrigation, *Water requirements, *Soil-water-plant relationships, Irrigation efficiency, Leaching, Evaporation, Evaporation pans, Water conservation, Soil moisture, Soil moisture meters, Tensiometers, Water loss, Weather, Automation, Irrigation engineering, Agricultural engineering.
Identifiers: *Irrigated agriculture, *Trickle irrigation, Water application rate.

The method of irrigation by drip or trickle systems (flow rates of less than 5 gal/hr) is well established in the U.S., Israel, Australia, and Mexico. In Arizona, these systems have enabled commercial operators to realize water savings of from 50% (in vegetables) to 95% in some tree installations. A simple method for determining the amount of irrigation water to use for a particular crop is discussed. Formulas and their use in determining the amount of water to apply each day, week, or other time period, are presented. Drip irrigation minimizes water losses, and tensiometers measure soil moisture, indicating the time and amount of irrigation required. This type of system is proving to be the ultimate in irrigation water conservation. (USBR)
W73-00317

THE EFFECT OF LOW OSMOTIC POTENTIAL ON PHOSPHATE UPTAKE AND METABOLISM BY BEETROOT DISCS,
Instituto Nacional de Tecnologia Agropecuaria, Castelar (Argentina). Centro Nacional de Investigaciones Agropecuarias.
M. E. Resbuk, and T. J. Flowers.
Ann Bot (Lond). Vol 35, No 143, p 1179-1189. 1971. Illus.
Identifiers: *Beet-D, Ethylene glycol, Mannitol, *Metabolism, *Osmotic potential, Oxygen, Permeability, *Phosphates, Phosphorus-32, Root-D.

The uptake of phosphate by aged beetroot discs was examined under a range of water deficits which were induced osmotically with mannitol or polyethylene glycol. At low water potentials the absorption of labeled phosphate was enhanced when the ambient concentration of phosphate was high (10-3 M) and the time for absorption was short (30 min): this occurred even when the metabolism was inhibited (by the water deficit), as indicated by lowered O2 consumption and incorporation of 32P into hexose-phosphate, phosphoglyceric acid, a lipid fraction, and a precipitate consisting mainly of cell walls. The Q10 of the uptake process approached unity as these low water potentials. Accompanying the enhanced uptake there was an increase in leakage of previously absorbed phosphate. It is postulated that the stimulation in uptake of phosphate in low osmotic potentials was due to an increase in permeability. Over long periods (6 hr) uptake was inhibited by treatment at low osmotic potentials. This is interpreted in terms of inhibition of a metabolic component of phosphate uptake.--Copyright 1972, Biological Abstracts, Inc.
W73-00318

PRE-WATERING OF COTTON IN THE SUDAN,
Zambia Univ., Lusaka.
M. A. Taha, and M. M. Musa.
Cotton Grow Rev, Vol 48, No 4, p 267-274, 1971.
Identifiers: *Cotton-D, Growth, Microbial populations, Soils, *Sudan, Weeds, *Pre-watering, *Nitrogen.

The results in the 2 seasons of experimentation clearly showed that N was the most important factor involved in pre-watering. N uptake by weeds was important in influencing the final yield of seed cotton. Weed growth resulted in a considerable increase in the denitrifying microbial population. The continued weed growth was dependent on rainfall distribution. In 1968-69, when the rainy season started early and rainfall was exceptionally heavy before sowing (278.9 mm), the weeds that emerged after pre-watering continued to grow vigorously until sowing, but in 1969-70 weed growth was light owing to low rainfall before sowing (43.4 mm). When conditions were conducive to excessive weed growth before sowing, weeds took up a high percentage of N and the effect of pre-watering was to reduce yield; when weed growth was poor, pre-watering had no effect on the final seed cotton yield.--Copyright 1972, Biological Abstracts, Inc.
W73-00345

THE EFFECT OF WATER TABLE ON FIELD CROPS: 1-COTTON,
Ministry of Agriculture, Cairo (Egypt). Soils Dept.
M. A. Barakat, W. M. El-Ghamry, N. A. Mohamed, and H. E. Ghazy.
UAR J Soil Sci, Vol 10, No 2, p 187-209. 1970. Illus.
Identifiers: *Cotton-D, Crops, *Water table, *Salinity, Saline soils.

Water table depths of 40, 70, 100, 130 and 160 cm from the soil surface were used to study the effect on cotton crops for 4 successive growth seasons. Groundwater salinities were 2200 and 4200 ppm for the seasons 1964, 1965 and 1966, and 8200 ppm for 1967. At groundwater salinity of 4200 ppm, or less, the yield of cotton approached the maximum at a water table depth of 100 cm, irrespective of variety or soil. The yield obtained at this depth was approximately 160% of that obtained at the 40 cm depth. Lint percentage declined within only 6% by lowering the depth of water table. Hazards of salinity to crops were absent. At a groundwater of salinity 8200 ppm, maximum yield was approached at a water table depth of 160 cm by raising the water table, the yield declined rapidly and the soil texture became an important factor. A sandy clay loam produced less yield than a clay loam soil, and a calcareous sandy clay loam soil took an intermediate position. Salinity hazards were present. Response to N-fertilization was affected by the depth of the water table. Efficient utilization coincided the depth of water table at which growth approached maximum. At high rates of N-fertilization, different soils were equal. At high rates of N-fertilization, different textured soils were equal in production but differed at relatively lower rates.--Copyright 1972, Biological Abstracts, Inc.
W73-00378

RESPONSE OF SESAME CROP TO IRRIGATION AND FERTILIZATION IN THE SANDY SOILS OF WADI EL-NATRUN AREA: I. INTERACTION BETWEEN WATER DOSES AND FREQUENCIES OF IRRIGATION AND THEIR EFFECT ON YIELD AND NUTRIENTS UPTAKE,
Ain Shams Univ., Cairo (Egypt). Dept. of Soils.
F. M. Abdou, S. Y. Metwally, H. Hamdi, and F. Batra.
UAR J Soil Sci., Vol 10, No 1: p 73-94. 1970. Illus.
Identifiers: *Crop yield, El-Natrun, *Fertilization, Irrigation, Nutrients, *Sesame-D, Soils, United Arab Republic, Wadi.

Two field experiments were carried out to study the response of sesame crop to irrigation. Both the frequency of irrigation and water dose highly influenced the seed yield of sesame. To obtain the highest yield (absolute yield) and the highest yield produced by 1 m3 of water (economical yield), 13 irrigations were recommended of 450 m3/acre each for the former yield and 150 m3/acre for the latter, all applied at 6 day frequencies. Following the latter scheme the yield of sesame and the amount of irrigating water reduced by about 23% and 67%, respectively. Using the water saved for irrigating new areas will increase the cultivated area by about 200% and consequently the yield will increase by the same rate. To obtain a yield containing the highest nutrients and higher than that of the absolute yield, 10 irrigations were recommended of 450 m3/acre each, followed by 3 irrigations of 350 m3/acre each, all applied at 6 day frequencies.--Copyright 1972, Biological Abstracts, Inc.
W73-00385

REHABILITATION AND BETTERMENT PROGRAM, CASCADE IRRIGATION DISTRICT (DRAFT ENVIRONMENTAL STATEMENT).
Bureau of Reclamation, Boise, Idaho. Region 1.
For primary bibliographic entry see Field 08A.
W73-00474

WATER PERMEABILITY OF IRRIGATED SOILS IN THE BUKHARA OASIS (IN RUSSIAN),
N. Y. Yakubov.
Nauchn Tr Tashk Univ. 378. p 195-201. 1970.
Identifiers: *Soil treatment, Bukhara oasis, *Irrigated land, Permeability, Soils, USSR.

Observations were conducted on old-irrigated meadow alluvial desert soils of varying texture under cotton. The water and air regime of the soils was improved by destruction of the compacted subarable horizon. Deepening of the arable horizon is recommended.--Copyright 1972, Biological Abstracts, Inc.
W73-00480

EFFECT OF CYANIDE ON RESPIRATION OF BEAN LEAVES SUBJECTED TO PRESOWING HARDENING TO DROUGHT (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Inst. of Plant Physiology.
P. A. Genkel', and S. V. Kushnirenko.
Fiziol Rast. Vol 18, No 5, p 947-953. 1971. English summary.
Identifiers: *Plant physiology, Bean-D, *Cyanide, Drought, Leaves, Phaseolus vulgaris D, Respiration, Sowing.

The aftereffect of atmospheric drought on the respiration rate and its sensitivity to cyanide were studied in Phaseolus vulgaris subjected to presowing hardening. The infiltration of KCN (0.01 M) into the leaves of the 1-3 tiers of nonhardened plants during the vegetative and flowering phases either did not alter the respiration rate or stimulated it. The aftereffect of atmospheric drought on respiration of nonhardened plants was manifested by the acquired sensitivity of the leaves to cyanide. The infiltration of cyanide into the leaves of the hardened plants inhibited respiration both before and after drought. The infiltration of cyanide into the leaves of the 5th tier during pod maturation inhibited respiration both in the hardened and nonhardened plants; drought did not affect the sensitivity of respiration to cyanide. Drought caused wilting and damaged leaf tissues. The hardened plants were less damaged than nonhardened plants during the vegetative and flowering phases. The degree of damage was the same in the hardened and nonhardened plants during pod maturation. A correlation supposedly exists between the sensitivity of respiration of bean leaves to cyanide and the resistance of the plants to atmospheric drought.--Copyright 1972, Biological Abstracts, Inc.
W73-00610

REDUCED AUTUMN-WINTER AND SPRING PRE-PLANTING SOIL CULTIVATIONS TO GRAIN MAIZE THROUGH USE OF HERBICIDES (IN BULGARIAN),
Academy of Agriculture Sciences, Karnobat (Bulgaria). Complex Research Inst. of Agriculture.
P. Dimov.
Rastenievod Nauki. Vol 8, No 5, p 125-131. 1971 English summary.
Identifiers: *Crop production, *Herbicides, Atrazine, Autumn, Bindweed D, Cirsium arvense D, Convolvulus arvensis D, Cultivation, Dalapon, Grains, *Maize M, Soils, Sonchus arvensis D, Spring, Thistle D, *Wheat M.

The possibility of reducing the number of autumn-winter and spring pre-planting soil cultivations to maize grown for grain through use of herbicides was studied in 1967-1969. The study was conducted with non-irrigated 'WIR-42' maize hybrid on chernozem-smolnitza soil. The basic tillage was done in Sept. or in Oct. after the first considerable rainfall, and was accompanied by Atrazine and Dalapon sprays at rates of 3.5, 5 and 10 kg/ha. These herbicides were highly effective against annual weeds and volunteer cereal plants when used in the autumn at 3.5 kg/ha. The field sow thistle (Sonchus arvensis), bindweed (Convolvulus arvensis) and creeping thistle (Cirsium arvense) are comparatively resistant but were retarded in their development. Higher Atrazine doses (5 and 10 kg/ha) do not impede the maize crop development. Atrazine rates of 10 kg/ha exert a strong inhibiting effect on wheat as a following crop, reducing its grain yield by 12-43%. The use of herbicides in the autumn at the basic soil tillage to maize may be successful in reducing the number of autumn-winter and spring pre-planting cultivations. The highest economic effect may be obtained both from maize and wheat as following crops when soil tillage is reduced only to one pre-planting cultivation by Atrazine and Dalapon each used at the rate of 3.5 kg/ha.--Copyright 1972, Biological Abstracts, Inc.
W73-00611

EFFECT OF SLIGHT IRRIGATION DURING DROUGHT ON WHEAT RESPIRATORY METABOLISM (IN RUSSIAN),
Kazan State Univ. (USSR).
A. A. Bichurina, L. K. Gordon, and S. A. Gonik.
Fiziol Rast. Vol 18, No 5, p 954-958. 1971. English summary.
Identifiers: *Crop response, Drought, *Irrigation, Metabolism, Oxidation, Phosphorylation, Rates, Respiration, *Wheat-M.

The effect and aftereffect of slight irrigation, maintaining soil humidity on the level of a wilting point, on the respiratory metabolism was studied in wheat cultivars 'Saratovskaya 29' and 'Diamant.' The respiratory metabolism was characterized by the respiration rate, the degree of oxidation-phosphorylation coupling (the stimulating effect of DNP (2,4-dinitrophenol) and the correlation between various respiration pathways (blocking of glycolysis by NaF). Slight irrigation during drought affected the respiration rate, increasing the degree of oxidation-phosphorylation coupling and changing the ratio between various respiration pathways towards glycolysis. The positive effect of slight irrigation was still manifested under conditions of a long-period drought. A possibility of such modifications of the plant respiratory metabolism induced by slight irrigation should be taken into account in the course of studies under conditions of drought.--Copyright 1972, Biological Abstracts, Inc.
W73-00616

THE EFFECT OF WIDTH OF DRILL AND RATE OF SOWING ON YIELD AND QUALITY OF WINTER WHEAT UNDER DIFFERENT ECOLOGICAL CONDITIONS (IN GERMAN),
Bayerische Landesanstalt fuer Bodenkultur, Pflanzenbau und Pflanzenschutz, Munich (West Germany).
G. Bachthaler.
Z Acker Pflanzenbau. Vol 134, No 1, p 25-41. 1971. Illus. English summary.
Identifiers: *Crop production, *Planting management, Ecology, Rates, Sowing, Wheat-M, Row width.

During 1964-1966 field experiments were conducted at 4 locations in Bavaria, differing in soil and climatic conditions, to study the effect row-width and seed-rate on the yield of 2 winter-wheat varieties. Taking the average of the experimental locations and years, the 2 varieties tested yielded the highest plant densities at the narrow row width of 14 cm. Within the seed-rates of 150-200 kg/ha, the highest seed rate gave the highest number of ears per square meter for all row widths. Compared with the 20 cm row width, the 14 cm row width gave an improvement of 4%. While on loamy soil a higher yield could be observed from the narrow width, sandy soil and low moorland showed only slight or no effect on yield. In the rainy years of 1965 and 1966 the narrow width of 14 cm gave a higher yield than in the dry year of 1964. At the lowest seed-rate of 150 kg/ha the mean yield showed an increase of 5% compared with the seed-rate of 200 kg/ha. The results for the different locations showed similar differences to those obtained with different drilling widths. On the other hand there was no evidence of any influence from the weather conditions during the years. The best yield was in a combination of the seed-rate of 150 kg/ha with a row width of 14 cm. This was true of all locations. There was no evidence of any significant effect of the different seed-rates and row widths on the thousand grain-weight, crude protein content and the sedimentation value of the winter wheat varieties covered by the present investigation.--Copyright 1972, Biological Abstracts, Inc.
W73-00628

EFFECT OF FERTILIZERS ON ERODED SOIL PRODUCTIVITY (IN UKRAINIAN),
M. H. Tyahny-Ryadno.
Mikrobiol Zh (Kiev). Vol 33, No 3, p 285-288. 1971. English summary.
Identifiers: *Fertilization, *Soil management, Bacteria, Erosion, Fertilizers, Minerals, Nutrients, Productivity, Soils.

Productivity of eroded S forest-steppe soils increased by applying mineral, organic and organo-mineral-bacterial fertilizers. The best results as to yield, nutrient and microbiological regime of washed-off soils were obtained with a fertilizer dose of 10 tons/ha.--Copyright 1972, Biological Abstracts, Inc.
W73-00629

INCREASE OF WINTER WHEAT GRAIN QUALITY UNDER CONDITIONS OF IRRIGATION (IN RUSSIAN),
Akademiya Nauk URSR, Kiev. Institut Fiziologii Rastenii i Agroskhimii.

S. I. Slukhai, and M. N. Zrazhevskii.
Fiziol Biokhim Kult Rast., Vol 3, No 3: p 303-313. 1971. Illus. English summary.
Identifiers: *Crop production, *Fertilization, Grains, Irrigation, Urea, *Wheat M.

Split applications of N against a background of basic fertilizer affect the formation of yield and grain quantity. Urea acquires great importance for late wheat dressing as a fertilizer and physiologically active substance. It activates accumulation of N substances, and affects the composition of amino acids and proteins. Urea N can be directly involved in the synthesis of amino acids in the ornithine cycle, producing increased accumulation of indispensable amino acids into protein.--Copyright 1972, Biological Abstracts, Inc.
W73-00643

WATER LOSSES AND WATER BALANCE STUDIES, PHILIPPINE LOWLAND RICE IRRIGATION,
Cornell Univ., Ithaca, N.Y. Dept. of Agriculture Engineering.
J. Kampen, and G. Levine.
Philipp Agric. Vol 54, No 5/6: p 283-301. 1970.
Identifiers: Irrigation, Philippine Islands, *Rice-M, *Water loss, *Water balance.

The magnitudes of water losses in 46 selected areas of 7 gravity systems and 26 pump irrigated areas in Laguna and Central Luzon were determined. Measured with the ponding technique, conveyance losses were small due to percolation and lateral seepage. The average loss was approximately 175 l/sq m/day and represented about 10% of average channel flow. Leakage and operational conveyance losses were variable, but were usually of a much greater magnitude. On farm or application losses were measured with a water budget technique. Percolation and lateral seepage averaged 1.5 mm/day. Direct drainage outflow in the gravity systems averaged 13 mm/day, resulting in average water use efficiencies of 30%, ranging from 4-92%. Pump system average 66% an efficiency ranging from 28-95%. Operation and management factors played a major role in determining the water loss. Supply was inversely related to level of control and management, and outflow was highly correlated with from 3400 mm per season at low levels of management and control, to 730 mm for very high levels of management and control.--Copyright 1972, Biological Abstracts, Inc.
W73-00648

CORN OF THE HYBRID VARIETY KNEZHA 36 IN BULGARIN,
Maize Research Inst., Knezha (Bulgaria).
V. Invalcinkov, G. Todorov, and G. Naidenov.
Rastenievod Nauki. Vol 8 , No 5: p 25-35. 1971. Illus.
Identifiers: *Crop production, *Corn M, Hybrids, Knezha-36, Variety.

A new corn hybrid, 'Knezha 36,' which was obtained by crossing line '73/56 B' with line '78-61,' was described. Both parent lines have high yields facilitating the production of hybrid seed. The new hybrid has notched grain and a red cob. The grain is yellow notched, and composes 76-83% of the weight of the ear. The ears, which are slightly conical, are perfectly equal in form, size, color, and type of grain. The plants are of average height: 190-220 cm without irrigation and 250 cm with irrigation. According to sowing density, 100 plants produce from 100-133 ears. Their stem is solid and resistant to lodging. With regard to the vegetative period, 'Knezha 36' is equal to the double hybrid resulting from a crossing of 2 lines of 'Wisconsin 641-AA.' Characteristics of this hybrid are its great resistance to dryness and the long peduncle of its ears. The hybrid is very productive and its future prospects are good. In a set of tests its average yield for 4 yr of non-irrigated cultivation reached a level of 8116 kg/ha as opposed to 6046 kg/ha for 'Wisconsin 641-AA.' In another set of tests, 'Knezha 36' surpassed 'Wisconsin 641-AA' in yield by 7.6-28.2%, and was equal to the Yugoslav hybrid obtained by crossing 2 'SK-4' lines, surpassing it in some of the test areas. Because of its better resistance to dryness, its yield during dry years is clearly distinct from that of other hybrid plants. For this reason 'Knezha 36' can be cultivated under more pronounced conditions of dryness. Under conditions of non-irrigation, the optimal sowing density is 28,000 to 36,000 plants/ha, while under conditions of irrigation, this density consists of 45,000 to 60,000 plants/ha.--Copyright 1972, Biological Abstracts, Inc.
W73-00649

04. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control of Water on the Surface

ESTIMATING THE T-YEAR FLOOD BY THE EXTENSION OF RECORDS OF PARTIAL DURATION SERIES,
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 02E.
W73-00025

LIBBY DAM AND LAKE KOOCANUSA, KOOTENAI RIVER, MONTANA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.
For primary bibliographic entry see Field 08A.
W73-00040

TELLICO PROJECT, FINAL ENVIRONMENTAL IMPACT STATEMENTS.
Tennessee Valley Authority, Chattanooga. Office of Health and Environmental Science.
For primary bibliographic entry see Field 08A.
W73-00041

MAINTENANCE OF THE HARLEM RIVER CHANNEL, NEW YORK, NAVIGATION PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.

Available from the National Technical Information Service as PB-206 399-D, $3.00 in paper copy. January 6, 1972. 10 p, 2 fig.

Descriptors: *New York, *Environmental effects, *Dredging, *Channel improvement, Maintenance, Stream improvement, Transportation, Administration, Maintenance costs, Planning, Turbidity.
Identifiers: *Environmental Impact Statements, *Harlem River Channel (N.Y.).

The project is a maintenance action consisting of dredging the existing federal channel in the Harlem River, New York, to its authorized project dimensions. The spoil will be deposited in the approved dumping area in Eaton's Neck Disposal area in the Long Island Sound. The project will provide access to commercial terminals by deeper draft vessels, yielding transportation savings, and help alleviate navigation difficulties and oil spills. Temporary turbidity and slight disruption to marine life will result in the dredging area. There will be a minor contribution to the regional problem of spoil disposal. Some minor disruption of benthic organisms will also result. The only alternatives are no maintenance and substitution of upland disposal of dredge soil for ocean disposal; however, neither is considered feasible. Formal communications in the form of transmittal of project plans and informal communications have been exchanged with the Fish and Wildlife Service and the Environmental Protection Agency regarding their concern about the impact of the project on the environment. (Widman-Florida)
W73-00043

MANITOWOC HARBOR, WISCONSIN (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Chicago, Ill.

Available from the National Technical Information Service as PB-201 843-D, $3.00 in paper copy.

Descriptors: *Wisconsin, *Channel improvement, *Environmental effects, *Dredging, Hydraulic engineering, Aquatic environment, Lake Michigan, Navigable waters, Non-structural alternatives, Recreation, Water pollution effects, Turbidity, Soil disposal fields, Wildlife conservation, Wildlife habitats, Harbors, Vegetation, Benefits, Costs, Feasibility.
Identifiers: *Environmental Impact Statements, *Manitowoc Harbor (Wis).

This project provides for the extension of the existing Manitowoc River channel upstream from the river mouth a distance of 720 feet. The extension is considered justified in the interests of light craft commercial and recreational navigation. The dredging operations will disrupt the present bottom populations consisting primarily of pollution worms. Since pollution worms have little value to the aquatic food chain of indigenous fish species, this impact is considered negligible. A temporary increase in turbidity will result from the operation of the hydraulic dredge, which is proposed to remove bottom material. The disposal of the polluted dredgings will affect existing vegetation in the bottom land disposal site. Also the effluent from the disposal site may run directly back into the river. However, requiring an adequate retention period for the effluent before disposal by controlled outflow will minimize this impact. The disposal site has little future value for wildlife with or without the proposed improvement. Due to the nature of the project the only alternatives considered were alternative disposal sites. (Ellis-Florida)
W73-00048

SKIATOOK LAKE, HOMINY CREEK, OKLAHOMA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 08D.
W73-00050

MANASQUAN RIVER, NEW JERSEY (DRAFT ENVIRONMENTAL STATEMENT).
Army Engineer District, Philadelphia, Pa.

Available from the National Technical Information Service as PB-208 469-D, $3.00 in paper copy. February 1, 1972. 11 p, 1 map.

Descriptors: *New Jersey, *Environmental effects, *Navigation, *Channel improvement, Maintenance, Channels, Water control, Recreation, Recreation facilities, Turbidity, Rivers, Tidal waters, Inlets (Waterways), Jetties, Bulkheads, Fishing, Dredging, Littoral drift, Pollution abatement, Benefits, Costs, Feasibility, Commercial fishing, River flow.
Identifiers: *Environmental Impact Statements, *Manasquan River (NJ).

This project involves the maintenance of an inlet channel in the Manasquan River located in eastern New Jersey. Periodic dredging is needed to maintain project channel dimensions. Repairs are made to jetties and bulkheads as needed. The project has provided a safe inlet for commercial and recreational vessels, thereby decreasing the chances of vessel damage by grounding or collision. The jetty

and bulkhead areas are used extensively for fishing. The inlet causes increased flow into and out of the river, providing a flushing action which tends to inhibit stagnation and pollution. The deep sea fishing industry is also aided by the protected inlet for operation of fishing boats. Maintenance dredging has been performed on a frequency of every two years. The dredged material, primarily sand with some silt, which is not polluted, is dumped offshore as close to shore as practical allowing possible deposit on nearby beaches by the littoral drift. The only significant adverse effect experienced is the temporary turbidity which accompanies the work. The alternatives considered and found less feasible include alternate disposal methods and suspension or termination of maintenance. (Ellis-Florida)
W73-00053

MILITARY OCEAN TERMINAL, SUNNY POINT, NORTH CAROLINA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Wilmington, N.C.

Available from the National Technical Information Service as PB-208 865-F, $3.00 in paper copy. May 5, 1972. 255 p, 19 fig, 26 tab, 33 ref, 4 append.

Descriptors: *North Carolina, *Environmental effects, *Channel improvement, *Dredging, Basins, Navigation, Navigable waters, Ships, Oceans, Turbidity, Surface waters, Wildlife habitats, Maintenance, Spoil banks, Dikes, Excavation, Saline water intrusion.
Identifiers: *Environmental Impact Statements, *Sunny Point (N.C.), Cape Fear navigation system.

The proposed project is designed to achieve regular maintenance dredging of the basins and channels in the Military Ocean Terminal, Sunny Point, North Carolina, a part of the Cape Fear navigation system. Land disposal sites will be utilized for the dredged material. The action will remedy the current shoaling in the basins and channels. The project will improve safety and convenience for navigation of military and commercial shipping. At design capacity 800 acres of diverse biotic communities within the disposal area will be filled with dredged material. As a result, all biotic communities presently found in them will be eliminated. Other adverse effects include temporary elevation of turbidity during operation, possible salt water intrusion into surface and groundwaters, dislocation of alligators and other wildlife resident in the disposal area, and possible loss of marine organisms drawn through the dredge. Alternatives considered include alternate disposal sites. Foregoing action will permit continued shoaling in the basins and channels ultimately resulting in the terminal being closed to ocean-going vessels. (Ellis-Florida)
W73-00054

TOWN OF COUSHATTA--FLOOD PREVENTION PROJECT MEASURE TWIN VALLEY RC AND D PROJECT, LOUISIANA (DRAFT ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 08A.
W73-00055

MAINTENANCE OF THE NEW YORK AND NEW JERSEY CHANNELS, NAVIGATION PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.

Available from the National Technical Information Service as PB-206 393-D, $3.00 in paper copy. January 4, 1972. 11 p, 1 map.

Descriptors: *Environmental effects, *Dredging, *New York, *New Jersey, Aquatic habitats, *Operation and maintenance, Atlantic Ocean, Channel improvement, Navigable waters, Turbidity, Navigation, Water quality, Water quality control, Spoil banks, Economic justification, Transportation, Channels.
Identifiers: *Environmental Impact Statements, *New York and New Jersey Channels.

The proposed action consists of dredging New York and New Jersey Channels to their authorized project dimensions. The existing project comprises the waterway extending around Staten Island, New York, from its intersection with the Main Ship Channel in lower New York Bay, generally following the boundary line between New York and New Jersey. The dredged spoils will be deposited in a designated disposal area in the Atlantic Ocean. The project will permit continued safe and economical use of the channels with direct benefits to ship transportation. There will be removal of bottom substrata and temporary turbidity with associated effects on the local marine life. Upsetting the bottom material during dredging could cause a reduction in the nutrients needed to sustain fish life, but this should be minor and short-lived. The only alternatives considered were no action and alternate disposal sites. (Waldron-Florida)
W73-00057

LAWRENCE, KANSAS, FLOOD PROTECTION PROJECT, KANSAS RIVER, KANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 08D.
W73-00058

BIG SIOUX RIVER AT AND IN THE VICINITY OF SIOUX CITY, IOWA AND NORTH SIOUX CITY, SOUTH DAKOTA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Omaha, Nebr.

Available from the National Technical Information Service as PB-206 261-D, $3.00 in paper copy. December 1971. 12 p, 2 map, 2 tab.

Descriptors: *South Dakota, *Channel improvement, *Bank stabilization, *Environmental effects, Channel erosion, Missouri River, Iowa, Flood protection, Rural areas, Community development, Land use, Urbanization, Bank erosion, Vegetation effects, Wildlife habitats, Nonstructural alternatives, Fisheries, Fish reproduction, Aquatic habitats, Flood control, Flooding, Benefits, Costs, Feasibility.
Identifiers: *Environmental Impact Statements, *Big Sioux River, *Sioux City (Iowa), *North Sioux City (S.Dak).

The proposed flood control project consists of 5.5 miles of channel enlargement and bank stabilization on the Big Sioux River in the Sioux City, Iowa and North Sioux City, South Dakota area. A portion of the channel will be relocated to eliminate a sharp bend and will then enter the Missouri River 7500 feet upstream from the present location. Flood protection will be provided to 1500 acres of urban and rural lands, thereby enhancing the area's economic development. The channel straightening and bank stabilization will significantly reduce bank erosion and also reduce a source of sedimentation, thus contributing to increased clarity of the river water. The new channel is designed to create more efficient evacuation of high flows and will limit the amount and relationship of feeding, spawning and escape areas necessary to support the present density of sport fish. Also approximately 25 acres of wildlife habitat and dependent wildlife will be lost. Alternatives examined and found impractical include floodplain zoning, reservoirs, diversions, and levee improvements. (Ellis-Florida)
W73-00060

A MODEL FOR MANAGING RESERVOIR WATER RELEASES,
Kansas Agricultural Experiment Station, Manhattan.
A. W. Biere, and I. M. Lee.
American Journal of Agricultural Economics, Vol. 54, No. 3, p 411-421, August, 1972. 4 fig, 25 equa, 12 ref.

Descriptors: *California, *Reservoir releases, *Reservoir operation, *Groundwater recharge, *Aquifers, *Economic efficiency, *Management, *Dynamic programming, *Markov processes, Optimization, Parametric hydrology, Water demand, Growth rates, Pumping, Costs, Streamflow, Percolation, Valleys.
Identifiers: *Salinas Basin, *Surface reservoirs, Reservoir capacity, Groundwater demand, Groundwater withdrawal.

Two surface reservoirs in California's Salinas Basin are utilized to increase recharge of valley aquifers. Under the assumptions of zero price elasticity of demand for groundwater, unregulated groundwater withdrawals, and the objective of economic efficiency, the management criterion is to maximize the present value of expected aquifer recharge where the value of a unit of recharge is the associated reduction in pumping costs. A cyclical Markov dynamic programming management model is employed, and optimal strategies are obtained. Results indicate the optimal strategy is relatively stable within the realistic range of alternative groundwater demand growth rates. The marginal value function for reservoir capacity is obtained by parametric analysis. (Bell-Cornell)
W73-00089

THE SAINT JOHN STUDY: AN EXAMPLE OF COMPLEMENTARY USAGE OF OPTIMIZATION AND SIMULATION MODELLING IN WATER RESOURCES PLANNING,
Acres Consulting Services Ltd., Niagara Falls (Ontario). Applied Mechanics Dept.
For primary bibliographic entry see Field 06A.
W73-00094

PEDOLOGICAL INFLUENCE OF SPRUCE PLANTED ON FORMER BEECH FOREST SOILS IN SCANIA, SOUTH SWEDEN,
Lund Univ. (Sweden). Dept. of Plant Ecology.
For primary bibliographic entry see Field 02G.
W73-00160

WATER BALANCE AND WATER REGIME OF AN AREA AND THEIR PURPOSEFUL ALTERATION (VODNYY BALANS I VODNYY REZHIM TERRITORII I IKH TSELENAPRAVLENNOYE PREOBRAZOVANIYE),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
For primary bibliographic entry see Field 06B.
W73-00193

RESERVOIR CONSTRUCTION ON LOWLAND RIVERS OF THE USSR (O SOZDANII VODOKHRANILISHCH NA RAVNINNYKH REKAKH SSSR),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 08A.
W73-00195

HYDROLOGIC STUDIES OF SMALL WATERSHEDS, CALAVERAS CREEK, SAN ANTONIO RIVER BASIN, TEXAS, 1955-68,
Geological Survey, Austin, Tex.
J. T. Smith, and W. B. Mills.
Texas Water Development Board Report 154, August 1972. 109 p, 15 fig, 17 tab, 27 ref.

Descriptors: *Flood control, *Watershed management, *Small watersheds, *Hydrologic data, *Tex-

as, Data collections, Engineering structures, Flood protection, Reservoirs, Rainfall-runoff relationships, Runoff, Flow control, Impoundments.
Identifiers: *Calaveras Creek (Tex), Elmendorf (Tex).

Inflow, pool consumption, and outflow for a group of nine floodwater-retarding reservoirs controlling runoff from 37.1 square miles in the 77.2-square-mile Calaveras Creek watershed near Elmendorf, Texas, are defined for the period 1955-68. During this period, annual rainfall ranged from 12.39 inches in 1956 to 40.41 inches in 1957. A total of 67,540 acre-feet entered the pools; 6,400 acre-feet was rainfall on the pool surfaces, and 61,140 acre-feet was surface runoff. Outflow from the pools was 43,700 acre-feet and 23,510 acre-feet was consumed in the pools by evapotranspiration and seepage. Net gain in pool content was 332 acre-feet. During 8 years of record, 1961-68, (when all structures were built) the structures prevented an average of 42% of the annual runoff from passing downstream as streamflow. The structures reduced peak discharge from a large storm by as much as 99%. There was a 40% reduction of the 25-year recurrence interval flood from about 9,600 to 5,600 cfs because of the structures. A rain-gage network study showed that the network of 10 rain gages could be reduced to four gages with a resulting loss in accuracy for the average rainfall of plus or minus 10 percent for about two-thirds of the time. (Woodard-USGS)
W73-00205

ENGINEERING INVESTIGATIONS,
Colorado State Dept. of Highways.
For primary bibliographic entry see Field 08D.
W73-00207

URBAN RUNOFF,
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 03D.
W73-00262

DESTRATIFICATION OF LAKES BY SELECTIVE WITHDRAWAL METHODS,
Wisconsin Univ., Madison. Water Resources Center.
For primary bibliographic entry see Field 02H.
W73-00264

RESTORING SUBSURFACE DRAIN PERFORMANCE,
Agricultural Research Service, Brawley, Calif. Imperial Valley Conservation Research Center.
L. B. Grass, and A. J. MacKenzie.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 98, No IRI, p 97-106, March 1972. 9 fig, 1 tab, 5 ref, append.

Descriptors: *Subsurface drainage, *Irrigation operation and maintenance, *Clogging, *Cleaning, Irrigation, Drainage systems, Silting, Root systems, Tile drains, Failure, Gypsum, Travertine, Field investigations, Precipitation (Chemistry), Repairing, Maintenance, Incrustation, Tile drainage, Salinity, Drainage.
Identifiers: Imperial Valley (Calif), Coachella Valley (Calif), Sulfur oxides, Colorado River, Dissolved salts, Irrigated agriculture, Jetting, Drain tiles.

Restoration of subsurface drain performance is vitally important in preventing soil salinity buildup. Malfunctioning tile drains must be quickly recognized by effluent flow measurements, water table elevation changes, and soil profile or drain effluent salinity increases. Deposits of iron and manganese precipitates in tile drains clog the openings through which water enters, creating a serious hazard to crops resulting from rising water tables and increasing soil salinity. Chemical treatment with a 2% mixture, by weight, of sulfur dioxide gas and water has been successful in restoring drain efficiency. Other types of mineral deposits encountered are gypsum and travertine. Gypsum deposits in the form of small crystals can be easily removed by high-pressure water jetting equipment; however, large, very dense crystals cannot be broken by jetting equipment or dissolved by chemicals and affected pipes must be replaced. Travertine deposits react quickly with most acids. The accumulations of very fine soil sediments which occasionally cause tile malfunctions are most effectively removed by high-pressure jetting equipment. Accumulations of fine roots can also be removed by this method, but long flexible rotating rods with cutting blades are best for removing larger roots. (USBR)
W73-00316

BOUND BROOK FLOOD CONTROL, SCITUATE, MASSACHUSETTS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.

Available from the National Technical Information Service as PB-206 266-D, $3.00 in paper copy, $0.95 in microfiche. January 14, 1972. 28 p, 2 plate, 5 tab.

Descriptors: *Massachusetts, *Environmental effects, *Channel improvement, *Flood control, Flood protection, Alternate planning, Stream improvement, Stream stabilization, Federal governments, Water management (Applied), Flooding, Waterfowl, Streamflow, Vegetation effects, Water conveyance, Watersheds (Basins), Water spreading.
Identifiers: *Environmental Impact Statements, *Scituate (Mass), Snagging, Clearing.

The proposed action is snagging and clearing for flood control in Bound Brook, Scituate, Massachusetts. The project will provide flood control and protection in the commercial center of North Scituate. The excavated material will be placed along either side of the channel and regraded into existing terrain. The flooding of Bound Brook is influenced by a flat channel gradient, obstructions in the channel, and landfill encroachment in a one-quarter mile reach of the brook. Loss of a small amount of hardwood trees and other vegetation may be expected during construction activities along the channel improvement area. Alternatives include retention of natural valley storage, upstream reservoir storage, alterations to existing outlet works at Hunters Pond, and no action. Included is a Letter Design Report, which assesses the general overbank flooding of Bound Creek into the commercial and residential section of North Scituate Village. A project plan of improvement is submitted which includes the removal of snags and obstructions, and widening and realignment of the existing channel. Also included is a brief letter concerning the project from the town of Scituate to the Corps of Engineers indicating its approval of the project. (Widman-Florida)
W73-00465

RIVER ROUGE FLOOD CONTROL PROJECT, WAYNE COUNTY, MICHIGAN (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Detroit, Mich.
For primary bibliographic entry see Field 08A.
W73-00468

NORTHEAST FLOOD STUDY, SUSQUEHANNA RIVER BASIN FLOOD CONTROL AND MINE SUBSIDENCE IN WYOMING VALLEY, PENNSYLVANIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 08A.
W73-00469

WESTERN UNIT FLOOD PROTECTION PROJECT, BILLINGS, MONTANA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Omaha, Nebr.
For primary bibliographic entry see Field 08A.
W73-00471

INTERBASIN TRANSFERS: NEBRASKA LAW AND LEGEND,
Florida State Univ., Tallahassee. School of Law.
J. C. Oeltjen, R. S. Harnsberger, and R. J. Fischer.
Nebraska Law Review, Vol 51, No 1, p 87-146, 1971. 2 fig, 3 map, 1 chart, 272 ref, append. OWRR B-007-NEB (2).

Descriptors: *Nebraska, *Interbasin transfers, *Watersheds (Basins), *Legislation, Basins, Drainage, Drainage area, Drainage engineering, Drainage practices, River basins, Groundwater basins, Watershed management, Agricultural watersheds, Diversion, Alteration of flow, Irrigation practices, Relative rights, Riparian rights, Appropriation, Inter-basin transfers, Legal aspects, Priorities, Water rights.

The problem of whether to permit transfers of water from one drainage basin to another is critical to the implementation of a state water plan in Nebraska. There have been two traditional approaches to transbasin diversion. Riparianism prevented diversion since it might result in injury to those owners below such diversion. The appropriation system of ordering rights in the water permitted diversion. Nebraska has a system in which both doctrines of water rights are given effect. Several unsuccessful attempts in the state legislature to enact transbasin legislation are traced. These attempts resulted from a leading Nebraska case prohibiting diversion and relying on a riparian rationale. Later cases have, if not overruled, at least confused the law set down in that case and there is need for legislative clarification concerning alternatives for maximum water utilization. Also discussed is whether transbasin diversion is an unconstitutional intrusion of vested water rights. Transbasin diversion in several other states and certain federal interests in such diversion are discussed. Transfers are desirable because they can be used to achieve full economic productivity but should be strictly administered. (Nielsen-Florida)
W73-00475

INTERPROVINCIAL RIVERS,
Department of Justice, Ottawa (Ontario).
For primary bibliographic entry see Field 06E.
W73-00490

WEST FORK DES MOINES RIVER, JACKSON, MINNESOTA, LOCAL PROTECTION PROJECT (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Rock Island, Ill.

Available from the National Technical Information Service as PB-198 726-F, $3.00 in paper copy, $0.95 in microfiche. March 15, 1972. 36 p, 1 map.

Descriptors: *Minnesota, *Environmental effects, *Flood protection, *Levees, Floodwalls, Floods, Flood control, Flood plain zoning, Floodproofing, Reservoirs, Access routes, Scenery, Ponding, Drainage, Sewerage, Sewage treatment, Sewers, Municipal water, Treatment facilities, Land use.
Identifiers: *Environmental Impact Statements, *West Fork Des Moines River.

The project consists of construction of 1.4 miles of levees, 0.1 mile of flood walls and a 4.5 acre ponding area, all for flood control protection for the city of Jackson, Minnesota. These actions coupled with modification of the city's sanitary and storm sewer system will protect 100 places of business, 20 residences, and the municipal water treatment and electric power plants. In addition to the

proposed protection, immediate floodplain management is recommended for the entire community. A small amount of acreage and associated vegetation will be committed to the project. The proposed protection will impede accessibility to the river and restrict the view of the river. The local environment will be temporarily disturbed by construction. Alternatives to the proposed project included evacuation, flood-proofing, raising of buildings, development of reservoirs, and levees and flood walls. These alternatives were not considered feasible from a social, environmental, and/or economical standpoint. The alternative of no project is considered detrimental to the safety and well-being of the town. (Nielsen-Florida)
W73-00498

TREASURE ISLAND, MISSOURI (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Memphis, Tenn.
For primary bibliographic entry see Field 08C.
W73-00500

DRAINAGE INTENSITY IN WESTERN NEW YORK,
Montana State Univ., Bozeman. Dept. of Geography.
J. J. Donahue.
Annals of the Association of American Geographers, Vol 62, No 1, p 23-36, March 1972. 7 fig, 2 tab.

Descriptors: *Drainage patterns (Geologic), *New York, *Drainage density, Geologic control, Glaciation, Topography, Geomorphology, Tributaries, Channels.
Identifiers: *Drainage intensity.

Three regions of the Allegheny Plateau have different drainage intensities on renewed surfaces in response to conditions imposed by glacial and periglacial processes. Because of the severe transformation of an antecedent surface into ice-streamlined form, postglacial stream concentrations are highest in the north and decrease southward as the degree of glacial modification diminishes, permitting the survival of relict landforms better adapted to normal erosional processes. Southward differences in surface mantle characteristics also effect the generation of drainage lines. (Knapp-USGS)
W73-00591

OPTIMIZING FLOOD CONTROL ALLOCATION FOR A MULTIPURPOSE RESERVOIR,
Montgomery (James M.) Consulting Engineers, Inc., Pasadena, Calif.
F. K. Duren, and L. R. Beard.
Water Resources Bulletin, American Water Resources Association, Vol 8, No 4, p 735-744, August, 1972. 3 fig, 1 tab, 9 ref.

Descriptors: *Reservoir operation, *Multiple-purpose reservoirs, *Optimization, *California, *Flood control, Water allocation (Policy), Simulation analysis, Systems analysis, Computer programs, Flood damage, Conservation, Recreation, Water supply, Benefits.
Identifiers: *Univariate gradient technique, *Flood control allocation, *Flood control diagram, *Folsom Reservoir, *American River, Water power, Economic analysis.

The univariate gradient technique is shown to provide meaningful information concerning the optimum operating policy of a single multipurpose reservoir. Use of the technique to derive the economically optimum flood control diagram for the Folsom Reservoir on the American River in central California is described. The technique is programmed for computer application so that the optimization process can be applied to other multipurpose reservoirs. Two computer programs developed at the Army Corps of Engineers' Hydrologic Engineering Center were utilized with modifications to simulate operation of the Folsom Reservoir. Economic analyses were incorporated along with the optimization technique into the reservoir operations program; the resultant program is capable of routing a sequence of monthly reservoir inflow, computing benefits for various flood control diagrams (as dictated by the optimization procedure), and selecting the economically optimum flood control diagram. The two computer programs are on file at the Hydrologic Engineering Center in Davis, California. (Bell-Cornell)
W73-00636

AN APPROACH TO EVALUATING ENVIRONMENTAL, SOCIAL, AND ECONOMIC FACTORS IN WATER RESOURCES PLANNING,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 06B.
W73-00637

INSTRUMENTATION FOR CROP-ENVIRONMENT MEASUREMENT IN A TROPICAL SAVANNAH CLIMATE,
Commonwealth Scientific and Industrial Reaearch Organization, Sydney (Australia).
G. F. Byrne, C. W. Rose, J. E. Begg, W. R. Torssell, and H. G. McPherson.
Aust Commonw Sci Ind Res Organ Div Land Res Tech Pap. 32. p 3-19. 1971. Illus.
Identifiers: *Bulrush millet, Climate, Crop environment, *Instrumentation, Lysimeters, Measurement, Millet-M, Pennisetum-Typhoides-M, Savannah, Stylo-D, Stylosanthes-Humilis-D, *Townsville stylo, Tropical.

Instrumentation used in the study of the energy, water vapor, and CO2 fluxes involved in the growth of 2 tropical forage crops (Townsville stylo (Stylosanthes humilis) and bulrush millet (Pennisetum typhoides)) is described, the system being based on a digital data logging system and a weighing lysimeter. The data handling procedure is outlined and the sampling and measurement errors likely to occur are considered.--Copyright 1972, Biological Abstracts, Inc.
W73-00650

4B. Groundwater Management

BIOLOGICAL INCRUSTATION OF WELLS DUE TO MASS DEVELOPMENT OF IRON AND MANGANESE BACTERIA,
Bundesgesundheitsamt, Berlin (West Germany). Institut fuer Wasser-, Boden-, und Lufthygiene.
For primary bibliographic entry see Field 05G.
W73-00008

AN ASSESSMENT OF POSSIBLE FACTORS CONTRIBUTING TO WELL LEVEL FLUCTUATIONS IN HOLDERNESS BOULDER CLAY, EAST YORKSHIRE,
Hull Univ. (England). Dept. of Geography.
M. Bonell.
Journal of Hydrology, Vol 16, No 4, p 361-368, August 1972. 1 fig, 20 ref.

Descriptors: *Water level fluctuations, *Recharge, *Glacial drift, *Water wells, *Water table, Hydrograph analysis, Soil moisture, Groundwater movement, Soil water movement.
Identifiers: *Yorkshire (England).

Analysis of water level fluctuations in Holderness boulder clay (England) showed that the response is not in agreement with the normal mechanism associated with groundwater recharge. There was an unusually short time lag between rainfall and the initial well hydrograph response. Seepage into the well from a perched water table located in the A soil horizon appears to be the source of water. (Knapp-USGS)
W73-00022

ARTIFICIAL RECHARGE OF THE LONDON BASIN,
Water Resources Board, Reading (England).
R. A. Downing, M. C. Davies, J. M. A. Pontin, and C. P. Young.
International Association of Hydrological Sciences Bulletin Vol 17, July 1972. p 183-187, 2 fig, 4 ref.

Descriptors: *Artificial recharge, *Groundwater basins, *Conjunctive use, Hydrogeology, Water sources, Cities, Municipal water, Water reuse, Water resources development.
Identifiers: *London Basin (England).

The London Basin is a synclinal structure in Cretaceous and Eocene strata in south-east England. It is one of the most densely populated parts of the British Isles, with about eight million people living in Greater London. If artificial recharge is to be used in the London Basin, it will be necessary to use the storage in the Lower London Tertiary sands, because the amount of storage available in the Cretaceous Chalk is relatively small. The main source of water for recharge would be surplus flows in the River Thames, but the Great Ouse river system, lying to the north of the Thames basin, could also be used, especially as facilities exist for transferring large volumes of water from this basin into rivers draining the eastern part of the London Basin. It may prove acceptable to recharge part of the sewage effluent from London, although tertiary treatment and sterilization to potable standards would be required before recharge. The use of underground storage in the London Basin is being considered by the Water Resources Board in the context of the optimum development of the total storage available in the Thames Basin, including surface storage, and the conjunctive use of this storage with the surface and groundwater resources. (Knapp-USGS)
W73-00024

PROPOSED DEEP GEOTHERMAL TEST WELL, GEOTHERMAL RESOURCES INVESTIGATIONS, IMPERIAL VALLEY, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Boulder City, Nev. Region 3.

Available from the National Technical Information Service as PB-206 161-F, $3.00 in paper copy. April 28, 1972. 82 p, 1 map, 1 tab, 2 chart.

Descriptors: *California, *Environmental effects, *Test wells, *Geothermal studies, Subsurface investigations, Water resources, Subsurface water, Water supply development, Brines, Saline water, Desalination, Electric power, Hydroelectric power, Steam, Thermal water, Deep wells, Southwest U.S., Electric power demand.
Identifiers: *Environmental Impact Statements, *Imperial Valley (Calif), *Geothermal test well.

The project involves drilling a well in the east mesa area of Imperial Valley, California in order to demonstrate the suitability of steam and brine recovery as a source of electric power. The well will be drilled from 4,000 to 8,000 feet deep and will have a slight impact on the underground strata due to the comparatively small amounts of fluid withdrawn for testing. Drilling will require that approximately 14 acres of sparsely vegetated desert be cleared for an access road and drilling operations. Impact on fish and wildlife, the air, plant life, and from an esthetic point of view will be minimal. In the absence of an investigation program and test well such as is proposed, development of geothermal resources will either not occur or would have to proceed directly to the production phase. This would preclude securing preliminary geothermal resource data, including data related to environmental impact for analysis, in an

orderly manner prior to large-scale operations. Without this investigatory program, other means of providing water and power will have to be devised to satisfy the growing needs of the Pacific Southwest. (Beardsley-Florida)
W73-00052

A MODEL FOR MANAGING RESERVOIR WATER RELEASES,
Kansas Agricultural Experiment Station, Manhattan.
For primary bibliographic entry see Field 04A.
W73-00089

APPLICATION OF MATHEMATICAL MODELLING TECHNIQUE TO REGULATION OF SUBTERRANEAN WATER RESERVES IN WATER ECONOMY SYSTEMS,
Belorusskii Nauchno-Issledovatelskii Institut Melioratsii i Vodnogo Khozyaistva, Minsk (USSR).
For primary bibliographic entry see Field 06A.
W73-00097

AN ELECTRICAL RESISTIVITY PROFILE IN HAWAII WITH NOVEL ELEVATION CORRECTION,
Hawaii Univ., Honolulu.
W. M. Adams.
European Association of Exploration Geophysicists, Vol 18, p 728-737, 1970. 5 fig, 10 ref.

Descriptors: *Groundwater resources, *Surveys, *Locating, *Exploration, *Hawaii, Drilling, Sites, Methodology, Instrumentation, Electrodes, Electrical resistance, Data collections, Water wells, Remote sensing, Resistivity.
Identifiers: *Well site locating, *Electrical resistivity profile.

In order to locate sites for drilling exploratory holes for fresh water, an electrical resistivity survey was conducted along the new Mahukona-Kawaihae Road on the west flank of the Kohala Mountain in Hawaii. Two resistivity soundings made at the same stations, using the Schlumberger electrode configuration, suggested a spacing of 275 feet for horizontal profiling with the Wenner array. The correlation coefficient of the elevation to profile data was 0.41. A procedure for removing elevation effect from resistivity was developed. Based on the reduced resistivity profile, four sites for additional exploration are specified. There is no specific interpretation of the data that can definitely indicate the occurrence of large underground reservoirs of fresh water anywhere along the profile. This is because the interpretation of horizontal profiling data is essentially relative and not absolute. (Woodard-USGS)
W73-00115

COASTAL AND URBAN SURVEYS WITH IR,
Hawaii Inst. of Geophysics, Honolulu.
For primary bibliographic entry see Field 07B.
W73-00116

WATER DEVELOPMENT ON TROPIC VOLCANIC ISLANDS--TYPE EXAMPLE: HAWAII,
Hawaii Univ., Honolulu. Water Resources Research Center.
F. L. Peterson.
Ground Water, Vol 10, No 5, p 18-23, September-October 1972. 9 fig, 2 ref.

Descriptors: *Hawaii, *Groundwater, Water resources development, *Water supply, *Hydrogeology, Water balance, Rainfall-runoff relationships, Infiltration, Aquifer characteristics, Permeability, Groundwater movement, Peak discharge, Surface-groundwater relationships.

Despite rainfalls which commonly exceed 200 inches per year in the mountainous portions of many of the islands in the Hawaiian chain, most streams in the islands are very flashy, and only a few carry water throughout the year. This is because of the extremely permeable volcanic rocks and soils which make up the Hawaiian islands. Development of reliable year-round sources of surface water is difficult, especially on the leeward portions of the islands. Surface storage is difficult because of the high infiltration capacities of the rock and soil cover. Ground water provides the most abundant and the most reliable source of water supply for these islands. Three modes of fresh ground-water occurrence may be distinguished: perched, dike-confined, and basal. Although perched and dike-confined ground water are of considerable local importance, the basal ground-water body is by far the most widely developed and most important source of fresh ground water for these islands. (Knapp-USGS)
W73-00128

PIT RECHARGE INFLUENCED BY SUBSURFACE SPREADING,
Colorado State Univ., Fort Collins.
D. B. McWhorter, and J. A. Brookman.
Ground Water, Vol 10, No 5, p 6-11, September-October 1972. 4 fig, 2 tab, 8 ref.

Descriptors: *Pit recharge, *Water spreading, *Infiltration, *Aquifer characteristics, Mathematical models, On-site tests, Hydrogeology, Percolation, Water management (Applied), Return flow, Water conservation, *Artificial recharge.
Identifiers: *Water spreading (Subsurface).

Artificial recharge from pits, trenches, or basins is feasible in situations where thick layer of slowly permeable material exists near the surface provided that a much more permeable stratum exists above the less permeable one. The more highly conductive layer acts as a subsurface spreading basin which greatly enhances the opportunity for recharge. The potential for recharge from pits penetrating a highly conductive layer underlain by a slowly permeable stratum can be calculated from the results of a simple theoretical analysis. A narrow pit or trench 525 feet long and 10 feet deep has the potential for recharging at a rate of 1 million gpd. Subsurface spreading occurs over nearly 10 acres for this case. Evaporation is reduced because the need for spreading the water over large areas on the land surface is eliminated. Since the length of pit perimeter and not the surface area is the important factor for design, the volume excavated can be minimized by constructing long narrow pits or trenches. (Knapp-USGS)
W73-00129

GROUND-WATER BASIN MANAGEMENT ON THE HIGH PLAINS OF TEXAS,
High Plains Underground Water Conservation District No. 1, Lubbock, Tex.
F. A. Rayner.
Ground Water, Vol 10, No 5, p 12-17, September-October 1972. 2 fig, 7 ref.

Descriptors: *Water management (Applied), *Water conservation, *Texas, *Water resources development, *Water districts, Governments, Water law, Legislation, Legal aspects, Water permits, Water rights, Equitable apportionment.

In Texas, the private ownership of ground water is guaranteed by the Texas Constitution. Under this law, local ground-water conservation districts were created, and in them ground-water basin management has been practiced in Texas for over two decades. Procedures are outlined for the creation of ground-water conservation districts. The structure, powers, and functions of the High Plains Underground Water Conservation District No. 1 are summarized. Although ground water in Texas is recognized as private property, and therefore is subject to the 'absolute ownership' doctrine, the residents and landowners of the High Plains Underground Water Conservation District No. 1 recognized over 21 years ago that ground water is held in public trust, and thereby provided for its management by this District under the 'reasonable use' doctrine. (Knapp-USGS)
W73-00130

NEW DATA ON UTILIZATION OF MINERALIZED GROUNDWATERS TO INCREASE SOIL PRODUCTIVITY (NOVYYE DANNYYE OB ISPOL'ZOVANII PODZEMNYKH MINERALIZOVANNYKH VOD DLYA POVYSHENIYA UROZHAYNOSTI POLEY),
Leningrad State Univ. (USSR).
For primary bibliographic entry see Field 03C.
W73-00192

WATER RECLAMATION FOR GROUND WATER RECHARGE,
Oklahoma Water Resources Research Inst., Stillwater.
For primary bibliographic entry see Field 05D.
W73-00269

POLLUTION STUDIES OF THE REGIONAL OGALLALA AQUIFER AT PORTALES, NEW MEXICO,
New Mexico State Univ., University Park. Water Resources Research Inst.
For primary bibliographic entry see Field 05B.
W73-00314

4C. Effects on Water of Man's Non-Water Activities

UNIVERSITY OF CINCINNATI URBAN RUNOFF MODEL,
Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05G.
W73-00118

HYDROLOGIC EFFECTS OF URBANIZATION IN THE UNITED STATES,
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 03D.
W73-00261

INVENTORY OF ESTUARINE SITE DEVELOPMENT LAGOON SYSTEMS: NEW JERSEY SHORE,
Rutgers - The State Univ., New Brunswick, N.J. Water Resources Research Inst.
For primary bibliographic entry see Field 05C.
W73-00265

4D. Watershed Protection

PEARL RIVER COMPREHENSIVE BASIN STUDY (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 08A.
W73-00049

BIG SIOUX RIVER AT AND IN THE VICINITY OF SIOUX CITY, IOWA AND NORTH SIOUX CITY, SOUTH DAKOTA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Omaha, Nebr.
For primary bibliographic entry see Field 04A.
W73-00060

SHOEMAKER RIVER WATERSHED, ROCKINGHAM COUNTY, VIRGINIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Richmond, Va.

Available from the National Technical Information Service as PB-206 177-D, $3.00 in paper copy. August 1971. 25 p, 1 map, 1 tab.

Descriptors: *Virginia, *Environmental effects, *Flood protection, *Watershed management, Land use, Erosion control, Land management, Sedimentation rates, Wildlife habitats, Community development, Non-structural alternatives, Agricultural watersheds, Water resources development, Flood plains, Fisheries, Recreation, Stream fisheries, Storm runoff.
Identifiers: *Environmental Impact Statements, *Shoemaker River Watershed (Va).

This watershed protection and flood prevention project will be implemented in the Shoemaker River Watershed, Virginia. Accelerated land treatment on 1,077 acres of farm and forest lands will reduce erosion, runoff and sedimentation and enhance wildlife habitats. Flood protection will be afforded to over 1,100 acres of land. The project will provide better distribution and a more dependable supply of water for wildlife in sediment pools, and 46 acres of lake fisheries. Recreational opportunities will be created. The project will result in a loss of forest, wildlife habitat and existing esthetic values on 57 acres of construction site as well as unavoidable erosion and sedimentation during construction. Other forest, wildlife habitats, and stream fisheries in the area will also be damaged. Alternatives considered and found less feasible than the proposed project include various combinations of non-structural measures, channel improvements and alternative sites, locations, designs, and systems of floodwater retarding structures. (Ellis-Florida)
W73-00061

SNAGGING AND CLEARING PROJECT ON GALLINAS RIVER, LAS VEGAS, NEW MEXICO (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Albuquerque, N. Mex.

Available from the National Technical Information Service as PB-205 199-F, $3.00 in paper copy, $0.95 in microfiche. January 28, 1972. 57 p, 1 map.

Descriptors: *New Mexico, *Environmental effects, *Flood protection, *Channel improvement, Obstruction to flow, Flood control, Floodwater, Mosquitoes, Rivers, Channels, Channel flow, River flow, Landscaping, Social aspects, Economic impact, Scenery, Shrubs, Trees, Vegetation establishment, Sediments, Bed load, Wildlife habitats, Water control, Water management (Applied).
Identifiers: *Environmental Impact Statements, *Las Vegas (NM), *Gallinas River.

The proposed emergency flood control project involves the clearing of approximately 5,200 feet of Gallinas River channel of obstructing vegetation and sediment deposits for the protection of adjacent properties and inhabitants in the City of Las Vegas, New Mexico. In addition to providing flood protection the project will eliminate stagnant pools that serve as breeding areas for mosquitoes. Channel enhancement and partial restoration of wildlife habitat will be brought about through retention of a majority of the larger trees, the reestablishment of grass cover and planting of forbs, shrubbery and evergreens. The project will necessitate the removal of a small strip of vegetation from the channel resulting in a small amount of wildlife habitat loss and associated minimal numbers of residential and transient wildlife. Alternatives considered include the use of existing upstream facilities to draw off floodwater, channel diversions, floodproofing and others. Included are comments from interested agencies and associations. (Ellis-Florida)
W73-00462

RUSSIAN RIVER BASIN (CHANNEL IMPROVEMENT AND BANK STABILIZATION) SONOMA AND MENDOCINO COUNTIES, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, San Francisco, Calif.

Available from the National Technical Information Service as PB-208 177-D, $3.00 in paper copy, $0.95 in microfiche. February 1972. 33 p, 2 map, 6 photo, 1 dwg.

Descriptors: *California, *Environmental effects, *Bank stabilization, *Channel improvement, River training, Wild rivers, Bank stability, Stream improvement, Bank erosion, Riprap, Soil erosion, Erosion control, Turbidity, Silting, Excavation, Channels, Wildlife habitats, Social aspects, Aesthetics, Recreation, Scenery, Wild River Act, Fisheries, Spawning.
Identifiers: *Environmental Impact Statements, *Russian River Basin (Calif).

As part of the continuing Russian River channel improvement and bank stabilization program, the project will protect three sites in Mendocino County and four sites in Sonoma County, California, with flexible fence, jacklines or riprap. The river flows for approximately 75 miles. Primary benefits of the project include stabilization of the river bank, redirection of the river flow at some locations and reduction in the loss of agriculture lands through erosion. Operation of equipment in the streambed during construction will cause a minimal increase in stream turbidity and the removal of vegetation in the stream channel will cause some resuspension of silts during periods of high river flows. The excavation of river bottom materials during construction may have detrimental effects on downstream spawning gravels. The straightening of the river's course curbs its meandering quality and reduces the natural appeal of its embankment in areas where works are emplaced. Other adverse effects will include the removal of riparian habitat and possible conversion of lands to agricultural use, possible effect on the river's potential inclusion in the National Wild and Scenic Rivers System, and temporary danger to canoeists from jacklines. Both structural and nonstructural alternatives to the proposed action were considered. (Ellis-Florida)
W73-00463

EIGHTEEN MILE CREEK WATERSHED, SOUTH CAROLINA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 08A.
W73-00467

HURRICANE CREEK WATERSHED STRUCTURAL PROJECT, MEASURE, KENTUCKY (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 08A.
W73-00472

PALZO RESTORATION PROJECT, ILLINOIS (DRAFT ENVIRONMENTAL STATEMENT).
Forest Service (USDA), Milwaukee, Wis. Eastern Region.
For primary bibliographic entry see Field 05G.
W73-00473

BREVARD COUNTY, BEACH EROSION CONTROL PROJECT (DRAFT ENVIRONMENTAL STATEMENT).
Army Engineer District, Jacksonville, Fla.

Available from the National Technical Information Service as PB-208 552-D, $3.00 in paper copy, $0.95 in microfiche. April 26, 1972. 47 p, 3 map, 12 tab, append.

Descriptors: *Florida, *Environmental effects, *Shore protection, *Beach erosion, *Erosion control, Beaches, Erosion, Wave (Water), Dredging, Oceans, Water quality, Turbidity, Coastal engineering, Water policy, Marine animals, Ocean waves, Seashores.
Identifiers: *Environmental Impact Statements, *Brevard County (Fla).

This project consists of partial restoration of 2.8 miles of Atlantic Ocean shoreline at the city of Cape Canaveral, Florida, and partial restoration and periodic nourishment of 2 miles of shore at the cities of Indialantic and Melbourne Beach. The purpose of the project is to mitigate the effects of erosion on the beaches and to provide a protective, recreational beach that will assist in reducing damage to shorefront property from severe storms and wave action. The dredging will temporarily degrade water quality causing the beach to be temporarily closed for public use. Near shore free-swimming marine organisms will suffer disruption from an increase in turbidity. Littoral and sublittoral invertebrates in the stretches receiving fill will be destroyed. Benthic organisms living in the immediate offshore dump area will also be destroyed. However, these effects are considered to be of a temporary nature with no lasting environmental damage. Foregoing action will provide no relief from the existing problems. Alternatives considered included the use of inland or commercial fill and no project. Included are twelve tables on cost and financial data. (Ellis-Florida)
W73-00478

NEW HOPE LAKE, HAW RIVER, NORTH CAROLINA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Wilmington, N.C.
For primary bibliographic entry see Field 08D.
W73-00488

MUD MOUNTAIN DAM AND RESERVOIR, WHITE RIVER, WASHINGTON (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Seattle, Wash.
For primary bibliographic entry see Field 08D.
W73-00502

BEACH EROSION PROJECT, DELAWARE COAST PROTECTION PROJECT, DELAWARE (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 08A.
W73-00506

FLOOD CONTROL ON SAGINAW RIVER, MICHIGAN AND TRIBUTARIES, FLINT RIVER AT FLINT, SWARTZ AND THREAD CREEKS (SECTIONS C-1 AND D) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Detroit, Mich.
For primary bibliographic entry see Field 08A.
W73-00509

ALPINE LAKE PROJECT, ALPINE, TEXAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Albuquerque, New Mex.
For primary bibliographic entry see Field 08D.
W73-00510

WATER EROSION OF SOILS AND THE EFFECT OF EROSION CONTROL ELEMENTS IN THE VOLGA UPLAND (IN RUSSIAN),
I. A. Kuznik.
Tr Sarat S-Kh Inst. 25: p 24-40. 1970.
Identifiers: *Soil erosion, *Erosion control, Alfalfa D, Erosion, Rye M, Soils, USSR, Volga.

The empirical and analytical methods for establishing correlation between erosion and its causative agents are discussed. Soil erosion is directly proportional to runoff, slope gradient and length, and the 'coefficient of erosion' CO (erosion for runoff 1 mm, gradient 1%, slope length 1 m or 1 km). Deep chernozems were 2 times more resistant to erosion than ordinary chernozems, 6 times more than southern chernozems, 8 times more than dark chestnut soils and 15 times more than gray forest soils. CO is affected by the aggregate composition (the coarser the aggregates, the smaller is CO) and the state of soil surface (winter fallow, old fallow, winter crops). The linear relation between erosion, gradient and slope length for sprinkled plots was confirmed experimentally. Differences in the formation of rill and sheet erosion are examined. Modifications in the calculation formula for the volume of rill erosion were made. The relation between the length of the belt free from rill erosion and the slope gradient was investigated. Proposed erosion control practices include water-retention levees, shelterbelts, flow dispersers, grassing, and furrow sowing of perennial rye, alfalfa and both crops mixed.--Copyright 1972, Biological Abstracts, Inc.
W73-00589

05. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification of Pollutants

DDT RESIDUES IN EGGS OF MARSH-INHABITING BIRDS,
New York State Dept. of Environmental Conservation, Albany.
J. Foehrenbach, G. Mahmood, and D. Sullivan.
New York Fish and Game Journal, Vol. 17, No. 2, p 126-127, July 1970. 1 fig, 1 tab, 6 ref.

Descriptors: *Pesticide residues, *DDT, *Bird eggs, Pesticides, DDD, DDE, Insecticides, Chlorinated hydrocarbon pesticides, Aquatic environment, Water pollution effects, Path of pollutants, Pesticide drift, New York.
Identifiers: *Marsh birds, *Clapper rails, Blackcrowned night herons, Marsh hawks, Long Island (N.Y.), Rallus spp., Nycticorax spp., Circus spp.

Since 1965 there has been a gradual decline in the number of nests of the clapper rail (Rallus longirostris) in several marshes along the south shore of Long Island, New York. While collecting rail eggs for study, eggs from nests of the blackcrowned night heron (Nycticorax nycticorax hoactli) and the marsh hawk (Circus hudsonius) were also collected. Although no evidence of thin-shelled eggs was detected in the present study, the values obtained for the marsh hawk and night heron eggs were sufficiently high to cause concern. Values for the clapper rail were low compared with those for other birds that are thought to be declining because of DDT residues in their eggs. These data suggest that perhaps other causes are responsible for the decrease in the numbers of clapper rails in Long Island marshes. (Svensson-Washington)
W73-00009

THE SIZE DISTRIBUTION OF PARTICLES IN THE OCEAN,
Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.
For primary bibliographic entry see Field 02J.
W73-00027

THE SPECTRUM OF PARTICULATE ORGANIC MATTER OF SHALLOW-BOTTOM BOUNDARY WATERS OF JAMAICA,
Yale Univ., New Haven, Conn. Dept. of Biology.
For primary bibliographic entry see Field 02J.
W73-00028

ION-SELECTIVE ELECTRODE STUDY OF COPPER (I) COMPLEXES IN ACETONITRILE,
State Univ. of New York, Buffalo. Dept. of Chemistry.
L. F. Heerman, and G. A. Rechnitz.
Analytical Chemistry, Vol 44, No 9, p 1655-1658, August 1972. 3 fig, 1 tab, 25 ref. EPA R-800991.

Descriptors: *Analytical techniques, *Copper compounds, *Electrodes, *Ion exchange, Chelation, Bromides, Chlorides, Iodides, Pollutant identification.
Identifiers: Ligands, Complexes, Thiourea, *Acetonitrile.

A cuprous sulfide-membrane ion-selective electrode showed nearly Nernstian response to Cu (I) concentrations >0.00001 molar in pure solutions in acetonitrile and >0.0000003 molar in the presence of complexing ligands. Stepwise formation constants of Cu (I) complexes with halides in acetonitrile were determined. Log beta-1 and log beta-2 values were: chloride, 4.9 and 10.7; bromide, 3.8 and 7.8; and iodide, 3.2 and 6.4. The predominant complex between Cu (I) and thiourea in acetonitrile had log beta-2 equal to 6.3. (Hoover-EPA)
W73-00065

VELOCITY DISTRIBUTION FAR OFF DOWNSTREAM AT THE WATER SURFACE OF A SUBMERGED JET,
Imatran Voima Osakeyhtio, Helsinki (Finland). Nuclear Power Project Group.
For primary bibliographic entry see Field 08B.
W73-00071

STUDY OF EFFLUENTS FROM LARGE POWER PLANTS,
Environmental Protection Agency, Raleigh, N. C. Div. of Meteorology.
F. A. Schiermeier.
Available from the National Technical Information Service as COM-72-10450, $3.00 in paper copy, $0.95 in microfiche. Paper presented at the American Industrial Hygiene Association Conference, Toronto, Canada, May 24-28, 1971. 19 p, 5 fig, 9 ref.

Descriptors: *Powerplants, *Fossil fuels, *Air pollution, Thermal powerplants, Meteorology, Pennsylvania, Instrumentation, Precipitation, Turbulence, Fly ash.
Identifiers: *Sulfur dioxide, Ground level concentrations, Air quality, Plume measurements, Helicopters, Downwash.

To determine the effectiveness of tall stacks in the management of air pollution from large power plants, the Division of Meteorology of the EPA is conducting a five-year field study in western Pennsylvania. Airborne plume measurements are obtained by means of an instrumented helicopter and supplemented through comprehensive ground-based meteorological and air quality observations. These data are being analyzed to define the meteorological conditions under which tall stack effluents are brought to the surface, frequency of occurrence of this phenomenon, and magnitude of the resulting ground level SO2 concentrations. Services of private contractors have been engaged to provide lidar and additional helicopter measurements of plume rise; to obtain fly ash particle size demonstrations and turbulence measurements in the plume aloft; to determine the scavenging efficiency by natural precipitation of airborne SO2; and to study cooling tower plume dispersion. Tall stacks appear to be more effective than their shorter counterparts in maintaining reasonable air quality surrounding generating stations. (Oleszkiewicz-Vanderbilt)
W73-00075

REMOTE SENSING OF THE CHESAPEAKE BAY.
For primary bibliographic entry see Field 05B.
W73-00101

PROJECT FOG DROPS, PART II: LABORATORY INVESTIGATIONS,
Cornell Aeronautical Lab., Inc., Buffalo, N.Y.
For primary bibliographic entry see Field 02B.
W73-00123

HYDROGEOCHEMISTRY OF THE SURFACE WATERS OF THE MACKENZIE RIVER DRAINAGE BASIN, CANADA--I. FACTORS CONTROLLING INORGANIC COMPOSITION,
Department of the Environment (Alberta). Inland Waters Branch.
For primary bibliographic entry see Field 02K.
W73-00124

HYDROGEOCHEMISTRY OF THE SURFACE WATERS OF THE MACKENZIE RIVER DRAINAGE BASIN, CANADA--II. THE CONTRIBUTION OF AMINO ACIDS, HYDROCARBONS AND CHLORINS TO THE BEAUFORT SEA BY THE MACKENZIE RIVER SYSTEM,
Calgary Univ. (Alberta). Exobiology Research Group.
For primary bibliographic entry see Field 02K.
W73-00125

WATER CHEMISTRY OF THE AMAZON RIVER,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
For primary bibliographic entry see Field 02K.
W73-00126

THE DETERMINATION OF STABLE ORGANIC COMPOUNDS IN WASTE EFFLUENTS AT MICROGRAM PER LITER LEVELS BY AUTOMATIC HIGH-RESOLUTION ION EXCHANGE CHROMATOGRAPHY,
Oak Ridge National Lab., Tenn.
S. Katz, W. W. Pitt, Jr., C. D. Scott, and A. A. Rosen.
Water Research, Vol 6, No 9, p 1029-1037, 1972, 7 fig, 1 tab, 12 ref.

Descriptors: *Chromatography, *Ion exchange, *Waste identification, Effluents, Analytical techniques, Pollutant identification.
Identifiers: *U. V. analyzer, *Carbohydrate analyzer.

U. V. -absorbing compounds in water at micro g/l levels were determined by using an adapted high-resolution anion exchange analyzer. Vacuum distillation and freeze-drying were used to concentrate the samples. Municipal primary sewage effluent showed seventy-seven peaks, with each constituent present at less than 100 micro g/l. Municipal secondary sewage effluent showed thirty-eight peaks, with each constituent at less than 20 micro g/l. The concentrations of compounds in industrial primary and secondary effluents were estimated at up to 1 mg/l; the secondary treatment caused little degradation. The sewage plant operating conditions as well as the type of feed sent to the treatment plant determine the chromatograms of the effluents. (Smith-Texas)
W73-00168

DETERMINATION OF CYANIDE IN INDUSTRIAL EFFLUENTS,
Upper Tame Main Drainage Authority, Birmingham (England).
P. J. Hewitt, and H. B. Austin.
Water Pollution Control, Vol 71, No 4, p 381-385, 1972, 4 tab, 7 ref.

Descriptors: *Pollution control, *Industrial wastes, Sewage effluent, Analytical techniques, Separation techniques, *Pollutant identification.
Identifiers: *Cyanide.

Research was conducted to develop a method that would separate the 'free cyanide' from various complex cyanides and provide a means for determining the amount of cyanide in industrial effluents. The cyanide was distilled from a slightly acid buffer solution, collected in alkali and titrated with silver nitrate solution. Lead and zinc acetate were used to prevent the decomposition of complex cyanides and sulphides. The method finally evolved is suitable for a wide range of industrial effluents. (Smith-Texas)
W73-00183

APHANOMYCES BLIGHT OF AMAZON SWORD PLANTS,
Florida Univ., Gainesville. Dept. of Plant Pathology.
For primary bibliographic entry see Field 05C.
W73-00252

POLYCHLORINATED BIPHENYLS IN COHO SALMON FROM WATERS OF LAKE MICHIGAN,
Michigan State Univ., East Lansing. Inst. of Water Research.
N. C. Leeling.
Available from the National Technical Information Service as PB-212 588, $3.00 in paper copy, $0.95 in microfiche. Michigan Institute of Water Research, Lansing, September 1972, Completion Report. 6 p, 3 ref. OWRR A-044-MICH (1). 14-01-0001-3222.

Descriptors: *Polychlorinated biphenyls, *DDE, Separation techniques, Oxidation, DDT, *Coho salmon, *Lake Michigan, Chromatography.
Identifiers: *Organochlorine insecticide residues.

Various physical and chemical methods used in attempts to separate the DDT complex, especially DDE, from polychlorinated biphenyls (PCB's) proved unsuccessful on a quantitative basis. These methods included high-speed liquid column chromatography, sulfuric and permanganate oxidation and derivatization with tetraphenylcyclopentadienone.
W73-00270

ACTIVITY STUDIES OF CHARGED AND UNCHARGED MOLECULES USING DETERGENT GEL MEMBRANE SYSTEMS,
Rome Univ. (Italy). Instituto di Farmacologia e Farmacognosia.
C. Botre, M. Mascini, and A. Memoli.
Analytical Chemistry, Vol 44, No 8, p 1371-1375, July 1972. 5 fig, 1 tab, 7 ref.

Descriptors: *Electrochemistry, *Measurement, *Selectivity, *Permselective membranes, Membrane processes, Gels, Detergents, Chemical reactions, Separation techniques, Ion exchange, Cations, Instrumentation, Aqueous solutions, Membranes.
Identifiers: *Membrane electrodes, Potassium stearate, Electromotive force, Molecules, Molecular activity.

The electrochemical behavior of detergent membrane systems was investigated through studies of activity of charged and uncharged molecules. Potassium stearate gel membranes in the presence of aqueous solutions containing different cations (H, Na, K, Cs, Ca, Mg) showed the typical behavior of an ion exchanger with high selectivity degree in the concentration range 0.001-1.0 M. (Selectivity constants were also evaluated.) This behavior is ascribed to the ordered structural organization of the gel. The electrochemical behavior is no longer the one expected for an ion exchanger in the presence of aqueous solutions containing uncharged molecules so that the results are explained in terms of a perturbation induced in the gel structure by the non-ionic compounds present in the aqueous medium. This effect allows the determination of the uncharged species in solution by means of electromotive force measurements. (Long-Battelle)
W73-00272

A SLIDING-CHAMBER PHYTOPLANKTON SETTLING TECHNIQUE FOR MAKING PERMANENT QUANTITATIVE SLIDES WITH APPLICATIONS IN FLUORESCENT MICROSCOPY AND AUTORADIOGRAPHY,
Alaska Univ., College. Inst. of Marine Science.
C. Coulon, and V. Alexander.
Limnology and Oceanography, Vol 17, No 1, p 149-152, January 1972. 3 fig, 1 tab, 4 ref.

Descriptors: *Phytoplankton, Laboratory equipment, Sedimentation, Methodology, Pollutant identification, Protozoa, Chrysophyta, Chlorophyta, Aquatic algae, Marine algae, Sessile algae.
Identifiers: *Fluorescent microscopy, *Autoradiography, Glutaraldehyde, Sample preparation, Counting, Sample preservation, Flagellates, Rhodomonas, Ikroavich Lake, Utermohl method.

A system has been devised for preparing permanent quantitative phytoplankton slides using sedimentation techniques. These slides can be used with a conventional microscope. A three-part settling chamber allows separation of the supernatant from the settled material. Water-soluble mounting medium added to the sample before settling prevents desiccation and distortion of the organisms. The pigment-preserving and mounting-medium qualities of glutaraldehyde combined with this method have applications in plankton counting and autoradiography. (Long-Battelle)
W73-00273

ATOMIC ABSORPTION DETERMINATION OF CHLORIDE UTILIZING THE BEILSTEIN TEST,
Iowa Univ., Iowa City. Dept. of Chemistry.
D. F. Tomkins, and C. W. Frank.
Analytical Chemistry, Vol 44, No 8, p 1451-1454, July 1972. 5 fig, 5 tab, 19 ref.

Descriptors: *Chlorides, *Aqueous solutions, Methodology, Halides, Inorganic compounds, Organic compounds, Chemical analysis, Anions, Cations, Ion exchange, Water analysis, Halogens, Copper, Sodium, Potassium, Aluminum, Calcium, Iron, Hydrogen, Nickel, Zinc, Fluorides, Bromides, Sulfates, Phosphates, Nitrates.
Identifiers: *Beilstein test, *Atomic absorption spectrophotometry, Chemical interference, Detection limits, Ethanol, Organic solvents, Sensitivity, Nebulizer, Silver, Barium, Ammonium, Hydroxyl, EDTA.

An atomic absorption technique which provides a direct determination of the chloride content in minute quantities of organic and inorganic solutions uses a burner assembly that exhibits a sensitive, linear, and stable response for chloride. The burner assembly provides chloride contact with hot metallic copper which increases the atomic copper content of the flame in proportion to the chloride concentration. This increase was monitored at the copper 3247.54 A line using standard atomic absorption methods. For inorganic chloride, the detection limit (defined as the concentration needed to give a signal-to-noise ratio of two) for the hydrogen-air flame was two ppm chloride and five ppm chloride for the acetylene-air flame. The useful analytical range for chloride determination was 50-200 ppm. The detection limit varied slightly with the type of organic chloride introduced. DDT had a detection limit of five ppm. Several repetitive determinations of various organic chlorides at 100 ppm revealed that standards must be matched closely with samples to ensure accurate analysis. Various cations and anions were tested for interference in water and ethanol solutions. No deflection was observed when those ions were nebulized without the halides (fluoride, iodide, bromide). The interferences from sodium and potassium limited inorganic chloride determination; however, ion exchange can be used to eliminate these ions. The response using ethanol was stable and reproducible and made the method practical for routine organic chloride determinations. This method lacks specificity for individual halides; however, it provides a rapid trace chloride determination without solution manipulation. (Snyder-Battelle)
W73-00274

LASER-EXCITED ATOMIC FLUORESCENCE FLAME SPECTROMETRY AS AN ANALYTICAL METHOD,
Florida Univ., Gainesville. Dept. of Chemistry.
L. M. Fraser, and J. D. Winefordner.
Analytical Chemistry, Vol 44, No 8, p 1444-1451, July 1972. 6 fig, 5 tab, 13 ref.

Descriptors: *Aqueous solutions, Chemical analysis, Alkaline earth metals, Methodology, Heavy metals, Pollutant identification, Nitrogen, Aluminum, Calcium, Cobalt, Chromium, Iron, Manganese, Nickel, Strontium, Titanium, Hydrogen, Ethane, Air, Water pollution, Molybdenum.
Identifiers: *Atomic fluorescence flame spectrometry, *Laser excitation, Detection limits, Precision, Lasers, Nitrogen laser, Gallium, Indium, Thallium.

A pulsed, tunable dye laser pumped with an elemental nitrogen laser is used to excite atomic fluorescence of Al, Ca, Co, Cr, Ga, In, Fe, Mn, Mo, Ni, Sr, Ti, and Tl in elemental hydrogen/air, ethane/air, and ethane/nitrous oxide flames. Laser-excitation has several advantages over conventional continuously operated line or continuum sources: Only one source is needed; freedom from flame background and analyte emission interferences; and the simplicity of using nonresonance fluorescence to eliminate noise due to scatter of exciting radiation from particles within the flame gases. In addition to resonance fluorescence, excited state resonance fluorescence, Stokes direct line fluorescence, and excited state anti-Stokes direct line fluorescence are shown to be analytically useful. Limits of detection and range of linearity of analytical curves are given for each element. (Byrd-Battelle)
W73-00275

RHODANESE ENZYME DETERMINATION USING ION-SELECTIVE MEMBRANE ELECTRODES,
State Univ. of New York, Buffalo. Dept. of Chemistry.
R. A. Llenado, and G. A. Rechnitz.
Analytical Chemistry, Vol 44, No 8, p 1366-1370, July 1972. 8 fig, 2 tab, 27 ref.

Descriptors: *Enzymes, *Chemical reactions, *Monitoring, Ions, Separation techniques, Measurement, Rates, Kinetics, Mathematical studies, Temperature, Evaluation, Hydrogen ion concentration.
Identifiers: *Cyanides, *Membrane electrodes, *Ion selective electrodes, Rhodanese, Thiocyanates, Thiosulfates, Substrate concentration.

Cyanide-sensitive membrane electrodes provide a rapid method for the detection of the animal en-

zyme rhodanese which catalyzes the formation of thiocyanate from cyanide and thiosulfate. It is possible to measure rhodanese enzyme activity by following the rate of disappearance of cyanide or the appearance of thiocyanate. In order to measure rhodanese activity, 10 ml of the substrate solution was pipetted into a double walled thermostatted cell with a temperature control of plus or minus 0.1 C and allowed to equilibrate to the desired temperature. One hundred microliters of the enzyme preparation is delivered into the system at equilibrium. To evaluate the feasibility of using the cyanide membrane electrode for monitoring the rate of rhodanese catalysis, isopotential selectivity ratios of cyanide over the other ions were measured by the method of Srinivasan and Rechnitz. Values calculated show that selectivity ratios for cyanide over thiosulfate, thiocyanate, and sulfite are approximately 10, 1,000, and 10,000, respectively. It is thus possible for the cyanide electrode to monitor the disappearance of cyanide without serious interference from the other ions present during the course of the reaction. The data on electrode parameters and experimental conditions (pH, substrate concentration, temperature) have been critically evaluated for analytical purposes. (Long-Battelle)
W73-00276

BIPOLAR DIGIPOTENTIOGRATOR FOR ELECTROANALYTICAL USES. DIRECT CONVERSION OF CHARGE TO A DIGITAL NUMBER,
California Univ., Berkeley. Lawrence Berkeley Lab.
For primary bibliographic entry see Field 07B.
W73-00277

A MODIFICATION OF THE VARIAN HR-60 NMR SPECTROMETER PROBE FOR OPERATION AT VERY LOW TEMPERATURES,
California Univ., Berkeley. Dept. of Chemistry.
For primary bibliographic entry see Field 07B.
W73-00278

CHEMICAL IONIZATION MASS SPECTROMETRY,
Waterloo Univ. (Ontario). Dept. of Chemistry.
F. W. Karasek.
Research/Development, Vol 23, No 4, p 63-64, 66, April 1972. 2 fig, 2 tab, 17 ref.

Descriptors: Chemical analysis, Ions, Methane, Nitrogen, Water pollution, *Pollutant identification, Chemical reactions, *Organic compounds, *Mass spectrometry.
Identifiers: *Chemical ionization mass spectrometry, Propane, Isobutane, Methanol, Mass spectra, Electrochemical reactions, Aromatic hydrocarbons.

A new and promising chemical ionization mass spectrometric technique is presented that yields simple spectra which provide unique information for chemical compound identification. Using this technique, simple mass spectra of compounds are produced from ions that are created as a result of ion-molecule reactions. This method of ion production is accomplished by reacting a small amount of chemical compound with a large amount of reactant gas (e.g. methane) which yield reactant ions formed by electron bombardment. This is done at pressures sufficiently high such that the very short mean free path (about 0.005 cm at 1 torr) insures collision between the charged reactant ions and the sample molecules, with a resultant charge transfer during the ion-molecule reactions that occur. To use the chemical ionization technique on conventional mass spectrometers, relatively simple modifications are necessary. The ability to change the spectrum of a compound under investigation by changing the identity of the reactant ion contributes significantly to the analytical capabilities of the chemical ionization technique. (Byrd-Battelle)
W73-00279

AUTOMATED COMBUSTION VERSUS DIGESTION FOR TRITIUM MEASUREMENT IN BIOLOGICAL SAMPLES,
Agricultural Research Service, Kerryville, Tex. Toxicological Research Lab.
L. M. Hunt, and B. N. Gilbert.
International Journal of Applied Radiation and Isotopes, Vol 23, No 5, p 246-249, May 1972. 1 fig, 2 tab, 8 ref.

Descriptors: *Digestion, *Tritium, *Automation, Chemical analysis, Bioassay, Pollutant identification, Suspension, Quenching, Aqueous solutions, Animal wastes, Solvent extractions, Water pollution sources, Thiocarbamate pesticides, Sheep.
Identifiers: *Biological samples, *Combustion, Ferbam, Tissue, Recovery, Liquid scintillation, Sample preparation, Lungs, Pancreas, Bone, Heart, Brain, Spleen, Muscle, Liver, Kidneys, Feces, Blood.

In order to find the most feasible method for analyzing tritium-tagged biological samples, the more frequently used techniques for noncombustion preparation, digestion, suspension, and extraction were compared with the automated combustion method. Sheep tissues were collected and prepared, and ferbam, a dithiocarbamate fungicidal compound, was used for recovery determinations. With the automated combustion method, the mean recovery for the first eight tissues at the 25 milligram level was 95 percent compared to 69 percent using digestion. When the sample sizes were increased, a notable difference in the comparison was apparent, as the percentage recovery was 82 percent for combustion and 40 percent by digestion. It appeared that digestion rather than combustion of the 25 milligram muscle samples was superior. No corrections were made for quenching in order to get a true comparison of the two methods of analysis. The disparity in methodology became marked with sample sizes of 50 and 100 micorliters with combustion maintaining a high efficiency, while digestion significantly decreased as sample size increased. Combustion had the advantage of speed (8-10 minutes per sample) with no clean-up between combustions. (Byrd-Battelle)
W73-00280

ON THE PHOTOLYTIC SEPARATION OF HALOGENS FROM SEA WATER CONCENTRATES,
Consiglio Nazionale delle Ricerche, Rome (Italy). Centro Nucleazione Aerosoli.
For primary bibliographic entry see Field 05B.
W73-00282

COLORIMETRIC DETERMINATION OF ALUMINUM IN SOIL EXTRACTS USING HAEMATOXYLIN,
Commonwealth Scientific and Industrial Research Organization, Glen Osmond (Australia). Div. of Soils.
R. C. Dalal.
Plant and Soil, Vol 36, No 1, p 223-231, February 1972. 3 fig, 5 tab, 9 ref.

Descriptors: *Aluminum, *Soil analysis, Colorimetry, Ions, Hydrogen ion concentration, Methodology, Color reactions, Chemical reactions, Heavy metals, Fluorides, Solvent extractions, Separation techniques, Iron, Manganese, Zinc, Calcium, Magnesium, Phosphorus.
Identifiers: *Haematoxylin, Chemical interference, Sensitivity, Recovery, EDTA, Citrates, Oxalates, Aluminon method, Absorbance, Sample preparation.

A colorimetric method has been developed for the determination of small quantities of aluminum in soil extracts using hematoxylin. KCN is used in this procedure to inhibit interference by iron. The effects of initial and final pH, time, variations in the amounts of haematoxylin and acetate buffer, and interference of ions on color development were studied. As compared with the standard aluminon method, this method is six times more sensitive. Aluminum in the soil extracts of complex forming reagents such as fluoride, oxalate, citrate, or EDTA can be determined. Relatively large microgram quantities of Fe, Mn, Zn, Ca, Mg and P had very little or no effect on quantities of Al as low as 0.5 microgram in 25 ml of alumina lake. Applicability of the procedure was tested by adding known amounts of Al to aliquots of various fluoride soil extracts; the recovery of the added Al was complete. (Snyder-Battelle)
W73-00283

NORTH CAROLINA MARINE ALGAE. I. THREE NEW SPECIES FROM THE CONTINENTAL SHELF,
Duke Univ., Durham, N.C. Dept. of Botany.
R. B. Searles.
Phycologia, Vol 11, No 1, p 19-24, March 1972. 4 fig, 10 ref.

Descriptors: *Distribution patterns, *Chlorophyta, *Marine algae, *Rhodophyta, *Systematics, Photography, Sea water, *North Carolina, Microscopy, Atlantic Ocean.
Identifiers: Trematocarpus papenfussii, Glioiderma atlantica, Codium carolinianum, *Onslow Bay (NC).

Three new species of marine algae were identified from collections made from the R/V Eastward using a Cerame Vivas rock dredge or a Cape Town dredge in Onslow Bay, North Carolina. Whole plants which had been preserved in formalin seawater were photographed while immersed in water. Red algae were stained with aqueous aniline blue dye for microscopic study; drawings and photographs of them emphasize cytoplasmic boundaries rather than cell walls. Drawings were made with the aid of a camera lucida. The three species were: one green alga, Codium carolinianum sp. nov. of the Codiales, and two red algae, Trematocarpus papenfussii sp. nov. of the Gigartinales and Glioiderma atlantica sp. nov. of the Rhodymeniales. The genus Glioiderma has not previously been reported from the Atlantic Ocean. All three plants grow offshore on the North Carolina continental shelf. (Long-Battelle)
W73-00284

CONTAMINANTS IN PENTACHLOROPHENOL: CHLORINATED DIOXINS AND PREDIOXINS (CHLORINATED HYDROXY-DIPHENYLETHERS),
National Swedish Environment Protection Board, Stockholm.
S. Jensen, and L. Renberg.
Ambio, Vol 1, No 2, p 62-65, April 1972. 5 fig, 1 tab, 9 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, *Gas chromatography, *Separation techniques, *Pollutant identification, Mass spectrometry, Alkalinity, Ion exchange, Ultraviolet radiation, Ethers, Phenolic pesticides, Pesticide toxicity, Centrifugation, Phenols, Fungicides, Chemical analysis.
Identifiers: *Pentachlorophenol, Chlorinated dioxins, Thin layer chromatography, Chlorinated phenols, Chemical interference, Metabolites, Isomers, Predioxin, Cleanup, Iso-predioxin, 2 3 7 8-tetrachloro-dibenzo-p-dioxin, Chlorinated hydrocarbons.

Pentachlorophenol formulations were analyzed for chlorinated dioxins, pollutants occurring in products of chlorinated phenol origin. A purified extract from a technical pentachlorophenate was analyzed gas chromatographically, and the presence of octachloro-dioxin detected, which was verified by gas chromatography-mass spec-

trometry. In order to assure that the dioxin had not formed as a result of alkaline conditions during extration, an ion exchanger was used to remove pentachlorophenate from the extract. The procedure did not alter the result. Diazomethane was used to treat the extract to avoid disturbance, and caused confusing changes in the chromatogram. The originally identified peak decreased and a new peak appeared suggesting the presence of unknown substances. Thin layer chromatography was used to separate those substances. One substance, a precursor of dioxin, was called predioxin. This hydroxy-nonachlorodiphenyl ether is formed from two molecules of pentachlorophenol. The reaction may stop here or continue to form dioxin. Two explanations are offered for predioxin not having been previously identified. First, it is removed by clean-up procedures or shaking with sulfuric acid. Second, it spontaneously forms dioxin in a gas chromatograph. Also identified was a substance isomeric to predioxin called iso-predioxin. (Mortland-Battelle)
W73-00285

REMOVING HEAVY METALS FROM WASTE WATER,
Dean Associates, North Scituate, R.I.
For primary bibliographic entry see Field 05D.
W73-00287

ARGON-WATER MIXTURES AS REAGENTS FOR CHEMICAL IONIZATION MASS SPECTROMETRY,
Virginia Univ., Charlottesville. Dept. of Chemistry.
D. F. Hunt, and J. F. Ryan, III.
Analytical Chemistry, Vol 44, No 7, p 1306-1312, June 1972. 2 fig, 3 tab, 23 ref.

Descriptors: *Argon, *Organic compounds, Chemical reactions, Chemical analysis, Instrumentation, Computers, Methodology, *Mass spectrometry.
Identifiers: *Reagents, *Chemical ionization mass spectrometry, *Mixtures, Hydrocarbons, 4-Decanone, Amines, DI-n-pentylamine, 5-alpha-dihydrocorticosterone, Steroids, Mass spectra.

The feasibility of using Ar-water mixtures as reagents for chemical ionization mass spectrometry (CIMS) was determined by measuring the mass spectra of 4-decanone, di-n-pentylamine, and 5-alpha-dihydroxy-corticosterone (DC). Samples of these compounds were injected into the spectrometer equipped with a dual electron impact (EI)-chemical ionization source for spectral analysis. Before analysis adjustment of the peak heights at m/e 40 and 19, where the arsenate/hydronium ion ratio is 2 to 5, was accomplished by allowing water to evaporate from an ampoule through a metering valve into a stream of argon (0.4 torr). Spectra containing abundant fragment ions and ions in the molecular weight region (M plus one) were obtained by repetitively scanning the Ar-water spectrum and monitoring with a storage oscilliscope. At a resolution of 10,000, the CI (Ar-water) and EI spectra of DC resulted in accurate mass spectral data which deviated less than 2.5 ppm from calculated values. The results indicate that this CI (Ar-water) spectrum exhibited characteristic features of both CI (methane) and EI modes and was applicable for analysis of small quantities of biological materials. (Long-Battelle)
W73-00290

ANALYSES OF POTASSIUM TEREPHTHALATE-BENZOATE MIXTURES BY COLUMN CHROMATOGRAPHY,
Phillips Petroleum Co., Bartlesville, Okla. Research Div.
M. W. Scoggins.
Analytical Chemistry, Vol 44, No 7, p 1285-1288, June 1972. 2 fig, 3 tab, 6 ref.

Descriptors: *Separation techniques, *Chemical analysis, *Organic compounds, Potassium compounds, Pollutant identification, Organic acids, Aromatic compounds, Methodology, Salts, *Chromatography.
Identifiers: *Column chromatography, *Benzoate, *Mixtures, *Potassium terephthalate, Sample preparation, Ultraviolet spectroscopy, Benzoic acid, Ultraviolet spectra, Chemical recovery, Tereohthalic acid.

A column chromatographic procedure used to separate simple aromatic dicarboxylates from benzoates is applied to the separation of mixtures of potassium terephthalate and benzoate for ultraviolet spectrometric analysis. Sample solutions containing mixtures of potassium terephthalate saturated with NaCl or blends of these compounds, prepared by grinding weighed quantities of terephthalic and benzoic acids with potassium carbonate, were placed in a NaCl solvent-saturated Amberlite XAD-2 resin column to affect separation. The compounds were then sequentially eluted with respective solutions of NaCl (flow rate 1-3 ml/min) and water (flow rate 5 ml/min) and saved for UV spectrophotometric analysis. The data indicated that potassium terephthalate, when making up 20-70 percent of the weight of a sample solution, was determined with a standard deviation of 0.54 and an average recovery of 99.6 percent. Benzoic acid was determined in a 10 - 60 weight percent range with a standard deviation of 0.78 and an average recovery of 99.1 percent; however, recovery could be improved to 99.4 percent by measuring benzoate in the 0.08 - 1.0 percent range. The recovered potassium benzoate and terephthalate were determined by their characteristic UV spectra at 222 and 240 nm, respectively. Conversion of potassium benzoate to benzoic acid with mineral acids resulted in a 30 percent increase in sensitivity. (Long-Battelle)
W73-00291

AUTOMATIC SPARK GAP CONTROL FOR SPARK SOURCE MASS SPECTROMETRY,
Cornell Univ., Ithaca, N.Y. Dept. of Chemistry.
B. N. Colby, and G. H. Morrison.
Analytical Chemistry, Vol 44, No 7, p 1263-1266, June 1972. 3 fig, 2 tab, 7 ref.

Descriptors: *Mass spectrometry, *Automatic control, *Heavy metals, Aluminum, Copper, Steel, Tungsten, Radioisotopes, Instrumentation, Control.
Identifiers: Precision, Sample preparation, Tantalum, Tungsten, Cu-63, V-51, Cr-52, Chemical interference, Detectors, Spark source mass spectrometry.

The design, construction, and operation of an inexpensive automatic spark gap controller for spark source mass spectrometry are presented as well as results showing its effectiveness. The spark gap controller is designed to operate with metals such as Fe, Al, stainless steel, Cu, Ta, and tungsten, keeping the breakdown voltage constant within 5 percent of the desired value averaged over any 100 msec period. For a graphite electrode, while operating with a 27 kV spark, control is within plus or minus .2 milli-inch for the mean vibration. This spark gap control and vibration yielded an optimal precision of 3.6 percent RSD for detection of Cu-63 in graphite. This high precision with spark gap control resulted from elimination of changes in ion production which could run as high as 100 percent. The effect of spark gap control on production of interfering ions was demonstrated by a 7-carbon univalent ion. The behavior of this ion during detection suggests a means of reducing C-polymer interference. (Long-Battelle)
W73-00292

A DIVER-OPERATED PLANKTON COLLECTOR,
Fisheries Research Board of Canada, St. John's (Newfoundland). Biological Station.
For primary bibliographic entry see Field 07B.
W73-00295

RECOVERY OF GRAM NEGATIVE BACTERIA WITH HEKTOEN AGAR,
Pennsylvania Water and Gas Co., Scranton.
For primary bibliographic entry see Field 05B.
W73-00301

HIGHLY SELECTIVE AND SENSITIVE SPECTROPHOTOMETRIC DETERMINATION OF IRON (II) AND COBALT (III) WITH 4- (2--PYRIDYLAZO)RESORCINOL (PAR),
Hokkaido Univ., Sapporo (Japan). Lab. of Analytical Chemistry.
T. Yotsuyanagi, R. Yamashita, and K. Aomura.
Analytical Chemistry, Vol. 44, No. 6, p 1091-1093, May 1972. 3 tab, 15 ref.

Descriptors: *Iron, *Cobalt, *Spectrophotometry, *Pollutant identification, Heavy metals, Trace elements, Colorimetry, Chemical analysis, Cations, Color reactions, Chemical reactions, Mercury, Lead, Chromium, Chelation, Aluminum, Methodology, Calcium, Cadmium, Copper, Magnesium, Manganese, Molybdenum, Sodium, Strontium, Zinc, Water pollution sources, Mercury, Kinetics, Potassium.
Identifiers: *4- (2-Pyridylazo)resorcinol, Chemical interference, Sample preparation, Absorbance, Sensitivity, Silver, Bismuth, Tin, Vanadium, EDTA, Barium, Palladium.

A spectrophotometric method is used for determining Fe or Co after chelation with 4- (2-pyridylazo)-resorcinol (PAR). Sample preparation involves adding sodium L-ascorbate to an Fe solution and 15 percent hydrogen peroxide to a Co solution and mixing each with 0.1 percent PAR. After adjusting the pH of the iron solution to 10 and the cobalt solution to 8.3, EDTA is added and the absorbance is measured at 500 nm for Fe or 510 nm for Co. For optimal conditions, 20 micrograms of Fe (II) and Co requires 0.3 ml and 0.2 ml of PAR, respectively. Various metal cations (Al, Ba, Bi, Ca, Cd, Cr, Cu, Hg, K, Mg, Mn, Mo, Na, Pb, Sn, Sr, V, and Zn) in moderate amounts (0 - 100 micrograms) and Ag (50 micrograms) caused only a slight interference. Among the metal ions studied, the only interference was caused by Pd, however, it could be easily avoided. Without interference, the method proved very selective and sensitive for the determination of 0 - 20 nanogram quantities of Fe or Co. (Long-Battelle)
W73-00302

SIMPLE METHOD FOR ROUTINE DETECTION OF RESIDUES OF DIETHYLSTILBESTROL (DES) IN MEAT CONTAMINATED AT LEVELS AS LOW AS ONE PART PER BILLION,
Animal Disease Research Inst., Hull (Quebc).
W. G. Smith, and E. E. McNeil.
Analytical Chemistry, Vol. 44, No. 6, p 1084-1087, May 1972. 2 fig, 11 ref.

Descriptors: *Methodology, *Pollutant identification, Solvent extractions, Chemical analysis, Carbon radioisotopes, Radioactivity techniques, Separation techniques.
Identifiers: *Diethylstilbestrol, *Electron capture gas chromatography, *Meat, Gas liquid chromatography C-14, Infrared spectrophotometry, Acetonitrile, Hormones, Steroids, Scintillation counting, Biological samples, Detection limits, Infrared spectra, Chemical recovery.

A new rapid method is presented for the identification of nanogram quantities of diethylstilbesterol (DES) residues in meat. Extraction with acetonitril:water (9:1) is followed by the removal of contaminating lipids from extracted DES with the aid of immiscible solvent systems, and the detection of the extracted DES by electron capture gas chromatography. To prepare samples for analysis 20 gm of meat were coarsely chopped, com-

bined with 100 ml of a acetonitrile:water mixture, and divided into four aliquots: 'cold aliquot', 'cold control', 'heated aliquot', and 'heated control'. All specimens were then subjected to a series of solvent extractions and additions to remove fatty acid interference and recover the added DES. The recovery was 73.2-83.4 percent for over 100 specimens tested. 'Cold' and 'heated' aliquot samples were treated with ethanol and analyzed with a gas-liquid apparatus fitted with an electron capture detector. IR spectra further indicated DES recoveries were successful down to the nanogram level. (Long-Battelle)
W73-00303

DETERMINATION OF FLUORINE AND BROMINE IN HALOGENATED HERBICIDE RESIDUES IN SOIL BY SPARK SOURCE MASS SPECTROMETRY,
Cornell Glass Works, N.Y. Research and Development Labs; and Cornell Univ., Ithaca, N.Y. Pesticide Residue Lab.
S. C. Tong, W. H. Gutenmann, L. E. St. John, Jr., and D. J. Lisk.
Analytical Chemistry, Vol. 44, No. 6, p 1069-1072, May 1972. 1 fig, 5 tab, 13 ref.

Descriptors: *Mass spectrometry, *Fluorine, *Bromine, *Soils, *Herbicides, *Pollutant identification, Spectrometers, Instrumentation, Separation techniques, Organic pesticides, Electrodes, Methodology, Soil analysis, Halogenated pesticides, Electrodes.
Identifiers: Bromacil, Bromoxynil, Trifluralin, Sample preparation, Brominated pesticides, Fluorinated pesticides, Spark-source mass spectrometry.

Canfield silt loam soil samples were analyzed for both fluorine- and bromine-containing halogenated herbicide residues by two methods of spark source mass spectrometry. Preparation of soil for analysis involved adding bromine herbicides, specifically bromacil and bromoxynil, and a fluorine herbicide, trifuralin, to individual soil samples. The herbicides were then extracted with acetone and combined with hexane. To analyze these extracts, two spectrophotometric procedures, one utilizing a graphite electrode (A) and the other utilizing a gold electrode (B), were used. When the graphite electrodes were employed, 20 graded exposures were made between the 0.001 and 100-nC level on the photographic plate; only five graded exposures were made between 0.003 and 0.1nC with the gold electrode. The precision for the determinations was plus or minus 15 to 25 percent of the mean as calculated from all analyses. Procedure B required less time for analysis than A (30 minutes) and was useful for quick surveys of biological materials, solutions, and water. However, it was not so precise as method A. (Long-Battelle)
W73-00304

FACTORS AFFECTING THE USE OF A NON-DISPERSIVE SYSTEM FOR ATOMIC FLUORESCENCE FLAME SPECTROMETRY,
Florida State Univ., Tallahassee. Dept. of Chemistry.
T. J. Vickers, P. J. Slevin, V. I. Muscat, and L. T. Farias.
Analytical Chemistry, Vol. 44, No. 6, p 930-935, May 1972. 8 fig, 2 tab, 18 ref.

Descriptors: *Spectrometers, *Measurements, *Mercury, Laboratory equipment, Instrumentation.
Identifiers: *Atomic fluorescence, *Arsenic, Flame spectrometry, Detection limits, Mercury chloride, Fluorescence spectroscopy.

A nondispersive atomic fluorescence system operating in the spectral region below 2800 angstroms was tested to determine the benefits derived from greater energy throughout and from multiple line collection of the system. Since background spectral radiance of the atom reservoir adversely affects fluorescence measurements, the system employs a chlorine cutoff filter with a solar blind multiplier phototube to eliminate most of the OH flame background emission while allowing relatively broadband response at wavelengths less than 2800 angstroms. Arsenic and mercury chloride in aqueous solution were analyzed in dispersive and nondispersive modes under a variety of flame conditions. For mercury, the limits of detection were 1 microgram per ml in the nondispersive mode and 6 micrograms per ml in the dispersive mode. For arsenic, limits were 6 micrograms per ml for the dispersive system at 1937 angstroms and 0.3 micrograms per ml for the nondispersive system. The effect of slit width was also investigated. (Long-Battelle)
W73-00305

DETERMINATION OF ALKYLBENZENESULFONATE AND ALKYLSULFATE HOMOLOGS, AFTER ELECTROPHORETIC SEPARATION USING AQUEOUS DIOXANE AGAROSE GELS,
Ohio Univ., Athens. Dept. of Chemistry.
J. R. Bodenmiller, and H. W. Latz.
Analytical Chemistry, Vol. 44, No. 6, p 926-930, May 1972. 1 fig, 8 tab, 8 ref.

Descriptors: *Electrophoresis, *Alkylbenzene sulfonates, *Separation techniques, Laboratory equipment, Gels, Chemical analysis.
Identifiers: Dioxane, Agarose, Methylene blue, Active substance, Dodecylsulfate, Chemical recovery, p- (1-Ethyldecyl)benzenesulfonate.

Alkylbenzene sulfonate and alkylsulfate homologs were separated for analysis using an electrophoretic cell which features direct contact between the gel and buffer solution and between the gel and the cooling surface. Following separation, the sample was extracted from the aqueous dioxane agarose gels with water and quantitatively analyzed by the methylene blue method. No significant differences were found in the amount of sample recovered from the gel after runs of 5 minutes, 1 hour, and 2 hours for 14 micrograms of pure p- (1-ethyldecyl)benzene sulfonate. The recovery was 88.4 percent with a standard deviation of 0.6 percent. The standard deviation for direct methylene blue analysis of the same compound was 1.4 percent. The significant difference in the recovery of dodecylsulfate between runs of 5 minutes and 2.5 hours was attributed to the greater precipitation of this substance in solution when compared to the alkylbenzene sulfonate. Two difficulties in the design of the experimental cell, involving a slightly uneven migration pattern and the short duration of runs, are expected to be easily corrected. (Pestel-Battelle)
W73-00306

SEPARATION OF HIGH-BOILING PETROLEUM DISTILLATES USING GRADIENT ELUTION THROUGH DUAL-PACKED (SILICA GEL-ALUMINA GEL) ADSORPTION COLUMNS,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
D. E. Hirsch, R. L. Hopkins, H. J. Coleman, F. O. Cotton, and C. J. Thompson.
Analytical Chemistry, Vol. 44, No. 6, p 915-919, May 1972. 5 fig, 4 tab, 17 ref.

Descriptors: *Gels, *Separation techniques, *Oil, Adsorption, Aromatic compounds, Organic compounds, Radioactivity techniques, Mass spectrometry, Nuclear magnetic resonance.
Identifiers: *Liquid solid chromatography, *Petroleum distillates, Saturates, Monoaromatics, Diaromatics, Polyaromatics, Gradient elution, C-14, Ultraviolet spectroscopy, Crude oil, Aromatic hydrocarbons.

A liquid-solid chromatographic procedure was developed which simply and reproducibly separates 25 to 50 gm samples of high-boiling petroleum distillates into four compound types-namely, saturates, monoaromatics, diaromatics, and polyaromatics-polar. Separation is accomplished by gradient elution through a dual-packed silica-alumina gel adsorption column under established conditions that eliminate the need for monitoring intermediate fractions by UV or other methods. The four compound-type concentrates can be collected through a continuous solvent stripper attached to the bottom of the column by consecutive elution, at an approximate flow rate of 200 ml/hr or the material eluted can be collected in small fractions directly from the bottom of the column and individually analyzed after solvent removal. The procedure is applicable to distillates with boiling ranges of about 330-540 degrees C and employs a sample-to-gel ratio of 1 to 100. The concentrates prepared by this adsorption procedure have but small amounts of cross contamination. Spectral, adsorption, and radiotracer data indicate the separated compound type concentrate fractions to be predominately as labeled. Such separations, by subdividing according to major aromatic types, greatly simplify subsequent separation and characterization studies. (Long-Battelle)
W73-00307

HEXACHLOROBENZENE (HCB) IN THE EGGS OF COMMON TERNS IN HAMILTON HARBOUR, ONTARIO,
Canadian Wildlife Service, Ottawa (Ontario).
M. Gilbertson, and L. M. Reynolds.
Bulletin of Environmental Contamination and Toxicology, Vol. 7, No. 6, p 371-373, June 1972. 1 tab, 9 ref.

Descriptors: *Fungicides, *Chlorinated hydrocarbon pesticides, *Bird eggs, *Pollutant identification, Polychlorinated biphenyls, Separation techniques, Bioassay, Chemical analysis, Water pollution sources, Heavy metals, Dieldrin, DDD, Smelts, Solvent extractions, Mercury.
Identifiers: *Hexachlorobenzene, *Electron capture gas chromatography, Gas liquid chromatography, Sterna hirundo, Sample preparation, Aroclor 1260, Terns, Heptachlor epoxide, p p' DDE, p p' DDT, Alewife, Alosa pseudoharengus, Osmerus mordax, Lake Ontario, *Hamilton Harbour, Cleanup.

Hexachlorobenzene, p,p'-DDE, dieldrin, and PCB's were quantitatively determined from common Tern (Sterna hirundo) eggs collected from two island colonies in Hamilton Harbour, Western Lake Ontario, in late August 1970. Other substances identified in the eggs were DDD, p,p'-DDT, heptachlor epoxide, and mercury. This is the first report of HCB in tissues and eggs in North American birds. The contents of each egg were homogenized, weighed, and dried. The dried material was mixed with anhydrous sodium sulfate and extracted with a 1:1 solution of ether: n-hexane. After solvent evaporation, the fat residue was weighed and dissolved in 5 percent benzene in acetone. This mixture was filtered through carboncelite, dried with sodium sulfate, and mixed with hexane. After additional sample cleanup using a Florisil column, the organo-chlorine residues were analyzed by gas-liquid chromatography - electron capture techniques. The PCB's were separated and quantified using Arochlor 1260 as a reference standard. The contaminants were tentatively traced to the tern's food supply during May and June, which consisted of fish such as alewives (Alosa pseudoharengus) and smelt (Osmerus mordax). The low ratio of DDE and PCB's in the eggs suggests that the source of HCB is industrial rather than agricultural. (Pestel-Battelle)
W73-00309

THE ROLE OF NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY AND MASS

SPECTROMETRY IN WATER POLLUTION ANALYSIS,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
L. H. Keith, A. W. Garrison, M. M. Walker, A. L. Alford, and A. D. Thruston, Jr.
In: American Chemical Society, Division of Water, Air and Waste Chemistry, Vol. 9, No. 2, (Preprints of papers presented at 158th National Meeting New York, New York, September 8-12, 1969). p 3-6, 2 ref.

Descriptors: *Mass spectrometry, *Nuclear magnetic resonance, *Organic compounds, *Pollutant identification, Water pollution, Effluents, Gas chromatography, Chemical analysis, Water pollution sources, Mercury, Chlorine, Freshwater, Radioisotopes, Chlorides, Alabama, Oil, Mississippi, Sampling, Oil wastes, Gasoline, Organic matter, Oil spills, Fungi, Tennessee River, South Carolina, Toxicity, Toxins, Tennessee, Organophosphorus pesticides, Diazinon, Water analysis, Fishkill.
Identifiers: *Characterization, Mass spectra, Phenyl mercuric chloride, Tombigbee River, Thin layer chromatography, Fuel residues, Boone Lake, Actinomycetes, 2-Methylisobornol, Methyl lithium, Camphor, Infrared spectroscopy, Infrared spectra, Monoterpenes, Limonene, p-Cymene, Terepinolene, Fenchone, Alpha-terpineol, Guaiacol, Fenchyl alcohol, s,s,s-tributyl phosphorotrithioite, Bis-2- (ethylhexyl)phthalate, Terpenes, Ketones, Organomercury compounds, Fingerprinting.

The use of NMR spectroscopy and mass spectrometry (MS) in the field of water pollution analysis has enabled the characterization and specific identification of chemicals causing pollution problems in cases where this was not previously possible or practical. These instruments are of great utility in solving problems of chemical identification which are beyond the scope of gas chromatographic and infrared analysis. After the identification is complete, the spectral 'fingerprints' provided by these instruments can be used as scientific evidence in enforcement actions which involve legal implications. Some of the applied NMR spectroscopy and MS analyses include identification of phosphorotrithioite pesticides, organomercuric compounds, insecticides, diazinon; petroleum spill products, phthalate compounds, 2-methylisaborneol, terpenes, ketones, and alcohols. (Long-Battelle)
W73-00311

ORGANIC POLLUTANTS FROM MILL PERSIST IN DOWNSTREAM WASTES,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
For primary bibliographic entry see Field 05B.
W73-00312

COMPUTER-CONTROLLED MASS SPECTRAL CHARACTERIZATIONS OF INDUSTRIAL ORGANIC POLLUTANTS,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
L. H. Keith, and J. M. McGuire.
Paper presented before the American Chemical Society Division of Water, Air, and Waste Chemistry, New York City, New York, August 1972. 6 p, 4 fig.

Descriptors: Computers, *Mass spectrometry, *Gas chromatography, Data storage and retrieval, Organic compounds, Pollutant identification, Effluents, Wastes, Water pollution sources, *Industrial wastes, Instrumentation, Alcohols, Ions, Equipment, *Data processing, Model studies, Chemical analysis, Pesticides, Control systems, Automatic control.
Identifiers: Characterization, *Organic pollutants, Flame ionization, Ionization detectors, Styrene, Phthalic anhydride, 2-Butoxyethanol, Methylnapthalene, Benzylalcohol, Tropylium, Xylenes, Sample preparation, Recovery, Metabolites.

A continuously monitored computer-controlled gas chromatography-mass (GC-MS) spectrometer apparatus was used to examine various industrial organic pollutants. The instrument consisted of a Finnigan quadripole MS interfaced to a GC. Data collected from the GC-MS analysis of pollutants was controlled by a System 150 controller and PDP-8 computer. About 500 spectra (30 to 400 amu) can be collected on 2 tape reels and about 2,600 of the same spectra can be transferred and stored on an auxiliary disc system. The value of the system is that spectral plots can be obtained in 6 minutes from the tape vs. 3.5 min from the disc, and limited mass reconstructed gas chromatograms require 30-35 min vs. 4-5 min, respectively. Using these instruments, organic pesticides are determined by matching spectra obtained from MS analysis with the best 5 matches of 11,000 stored in a computer. The system lends itself to identification of hydrocarbons, pesticides, metabolites, alcohols, and other organic compounds. (Long-Battelle)
W73-00313

POLLUTION STUDIES OF THE REGIONAL OGALLALA AQUIFER AT PORTALES, NEW MEXICO,
New Mexico State Univ., University Park. Water Resources Research Inst.
For primary bibliographic entry see Field 05B.
W73-00314

MICROBIOLOGICAL DECOMPOSITION OF PHENOL: I. ISOLATION AND IDENTIFICATION OF PHENOL METABOLIZING YEASTS, (IN JAPANESE),
Toyama Univ. (Japan). Dept. of Industrial Chemistry.
For primary bibliographic entry see Field 05B.
W73-00321

SPECTROPHOTOMETRIC INVESTIGATION OF ANALYTICALLY IMPORTANT METAL COMPLEXES,
Waterloo Univ., (Ontario). Dept. of Chemistry.
B. W. Budesinsky.
Zeitschrift fur Analytische Chemie, Vol 258, No 3, p 186-189, February 8, 1972. 1 tab, 5 ref.

Descriptors: *Spectrophotometry, Stability, *Mathematical studies, Ions, *Metals.
Identifiers: *Metal complexes, Ligands, Stability constants, Molar absorptivity, Precision.

Mathematical methods employing spectrometric data are described for estimating composition, molar absorptivity, and effective and overall stability constants of complexes M sub m Y sub i H sub j L sub n where Y is the ligand from buffer, solvent, or masking reagent. The complexes generally have a constant metal to ligand ratio and occur with complexation of polydenate ligands or metal ions of low coordination number. Precision of the method is investigated. (Snyder-Battelle)
W73-00330

3-NITROSO-4-HYDROXYCOUMARIN AS INDICATOR FOR THE TITRATION OF IRON (III) WITH EDTA,
Hans Raj Coll., Delhi (India).
G. S. Manku.
Zeitschrift fur Analytische Chemie, Vol 258, No 5, p 365-366, May 16, 1972.

Descriptors: *Volumetric analysis, *Colorimetry, *Indicators, *Iron, Heavy metals, Cyanides, Ions, Nickel, Cobalt, Copper, Sulfates, Bromides, Zinc, Cadmium, Calcium, Strontium, Manganese, Beryllium, Magnesium, Uranium, Phosphates, Fluorides, Lead, Titanium, Methodology.
Identifiers: *3-nitroso-4-hydroxycoumarin, *EDTA, Chemical interference, Thiocyanates, Oxalates, Vanadium, Bismuth, Palladium, Tartrates, Citrates, Thiosulfates, Barium, Molybdate, Antimony, Zirconium, Tungsten.

3-Nitroso-4-hydroxycoumarin was successfully used as an indicator for the titration of iron with EDTA by first adjusting the pH of a 1-70 mg solution of Fe (III) to about 2 with ammonium hydroxide and then adding a hydrochloric acid/sodium acetate buffer. After 5-10 drops of 0.5 percent ethanolic solution of 3-nitroso-4-hydroxycoumarin were added, the solution was diluted to about 100 ml and titrated with 0.02 M or 0.05 M EDTA solution up to a sharp color change from blue to colorless or greenish blue with higher iron contents. Of the number of ions investigated, cyanide, thiocyanate, oxalate, vanadium, bismuth, nickel, cobalt, copper, and palladium were found to seriously interfere. The relative standard deviation of the method was 0.5 to 0.75 percent. (Long-Battelle)
W73-00331

AN IMPROVED COLUMN CHROMATOGRAPHIC METHOD FOR ISOLATION OF TRYPTOPHAN METABOLITES,
Oklahoma State Univ., Stillwater. Dept. of Biochemistry.
N. C. Chen, and R. K. Gholson.
Analytical Biochemistry, Vol 47, No 1, p 139-145, May 1972. 4 fig, 13 ref.

Descriptors: *Separation techniques, *Chromatography, Instrumentation, Methodology, Organic compounds, Chemical analysis, Fluorometry, Colorimetry, Physical properties, Data analysis, Urine, Rats, Ureas, Volumetric analysis, Plant tissues.
Identifiers: *Tryptophan, *Metabolites, Paper chromatography, Column chromatography, Kynurenine, Indoleacetic acid, Indoleaceturic acid, Indole-3-carboxaldehyde, 5-Hydroxyindoleacetic acid, Xanthurenic acid, Kynurenic acid, Indoleacetonitrile, Tryptamine, Serotonin, 5-hydroxytryptophan, 3-hydroxykynurenine, 5-hydroxytryptamine, Biological samples.

A DEAE-cellulose column chromatographic technique has been developed that separates with quantitative recovery most of the major tryptophan metabolites which retain the indole ring or the alanine side chain. A mixture of tryptophan and twelve of its metabolites (300 micrograms each) was dissolved in 10 ml of water and loaded onto a 1.2 x 30 cm column of DEAE-cellulose; the column was then eluted with 80 ml of 0.001 M TEA-F, pH 4.0, and 2 ml fractions were collected. The column was then eluted with a gradient formed by placing 250 ml of 0.001 M TEA-F, pH 4.0, in a cylindrical mixing chamber that was connected to a reservoir of equal dimensions containing 250 ml of 0.1 M TEA-F, pH 4.0. Fractions of 4 ml were collected. The fractions of the first two peaks were combined, lyophilized, and dissolved in 10 ml of water and loaded onto a second column of DEAE-cellulose (amine form). The temperature for both columns was 4 C. The recovery of the authentic compounds was more than 95 percent from both columns. Using triethylamine-formate buffers in this system facilitates quantitative recovery of the isolated metabolites. Urine or crude aqueous plant tissue extracts can be used with this method without prior extraction or fractionation. (Snyder-Battelle)
W73-00332

A NEW REACTION FOR COLORIMETRIC DETERMINATION OF CARBOHYDRATES,
Greenlane Hospital, Auckland (New Zealand). Pathology Dept.
M. Lever.
Analytical Biochemistry, Vol 47, No 1, p 273-279, May 1972. 4 fig, 3 tab, 3 ref.

Descriptors: *Colorimetry, *Carbohydrates, Aqueous solutions, Spectrophotometry, Absorption, Fluorescence, Water pollution, Pollutant identification, Proteins, Calcium.
Identifiers: Yellow anions, Acid hydrazides, Double-beam spectrophotometers, Glucose, Sugars, Spectrofluorometers.

The possibility of using the intense absorption of yellow anions for the colorimetric determination of carbohydrates was investigated by preparing sample solutions of acid hydrazides and determining the absorbance by spectrophotometry. Absorbance spectra were scanned with a double-beam spectrophotometer, and the fluorescence measured with a spectrophotofluorometer for the reactions of acid hydrazides with glucose and other common low molecular weight carbohydrates. Acid hydrazides react in alkaline solutions with reducing carbohydrates to give yellow anions. The reaction with p-hydroxybenzoic acid hydrazide can be used in a simple colorimetric method to detect less than 1 microgram glucose or similar sugar. Calcium and very high protein concentrations are the only interfering factors that have been found. (Byrd-Battelle)
W73-00333

DETERMINATION OF COBALT IN PLANT MATERIAL BY ATOMIC ABSORPTION,
School of Agriculture, Aberdeen (Scotland).
A. L. Gelman.
Journal of the Science of Food and Agriculture, Vol 23, No 3, p 299-305, March 1972. 1 fig, 5 tab, 18 ref.

Descriptors: *Cobalt, *Separation techniques, *Spectrophotometry, Pollutant identification, Chelation, Instrumentation, Laboratory equipment, Methodology, Radioisotopes, Plant tissues, Radioactivity techniques, Heavy metals, Grasses, Grains (Crops).
Identifiers: Plants, *Methylisobytylketone, *Atomic absorption spectrophotometry, Co-60, Ammonium pyrrolidine dithiocarbamate, Detection limits, Biological samples.

A simple method has been developed for the determination of cobalt in plant material by atomic absorption spectrophotometry. Plant samples included rolled barley, dried grains, hay, pine needles, Rhododendron, Swedes, grass, and mixed herbage. Specially prepared ashed samples were dissolved in 0.1 N-HCl and evaporated to dryness under infrared lamps. The cobalt present was chelated with ammonium pyrrolidine dithiocarbamate and extracted from the aqueous solution with methylisobutylketone. The organic phase so formed was presented to the atomic absorption spectrophotometer. All atomic absorption measurements were made with a Varian-Techtron AA4 atomic absorption spectrophotometer, using the adjustable burner-nebulizer assembly, and grooved titanium burner head. An air-acetylene flame and an auxiliary air supply were used. The high intensity ASL (Atomic Spectral Lamps) cobalt lamp was operated at 12.5 mA with a spectral slit width of 1.7 nm. Samples were aspirated at the rate of 4 ml/min, and a scale expansion of times-4 was used for all measurements. This method was able to detect cobalt from 0 to 0.5 p.p.m. The efficiency of extraction was estimated using cobalt-60. Concomitant spectrographic analyses together with recovery experiments and replicate analyses showed that the method was suitably accurate for analyzing plant material for its cobalt content in nutrition studies. (Long-Battelle)
W73-00334

THE DETERMINATION OF TRACE METALS IN MICROLITRE SAMPLES BY PLASMA TORCH EXCITATION, WITH SPECIAL REFERENCE TO OIL, ORGANIC COMPOUNDS AND BLOOD SAMPLES,
Albright and Wilson Ltd., Oldbury (England). Research Dept.
S. Greenfield, and P. B. Smith.
Analytica Chimica Acta, Vol 59, No 3, p 341-348, May 1972. 10 fig, 3 tab, 12 ref.

Descriptors: *Instrumentation, *Heavy metals, *Trace elements, Chromium, Iron, Aluminum, Copper, Nickel, Magnesium, Manganese, Phosphorus, Lead, *Oil, *Organic compounds, Pollutant identification, Calibrations, Organophosphorus compounds.
Identifiers: *Atomic absorption, *Plasma torch spectroscopy, *Biological samples, Blood, Barium, Titanium, Silicon, Silver, Xylene, Detection limits, Precision, Pneumatic nebulizer, Lanthanum, Calibration curves.

Plasma torch excitation coupled with conventional spectrographic analysis proved to be a suitable technique for multi-element analysis of trace metals in inorganic and organic materials. Blood, oil, and organic compounds such as xylene were analyzed for trace elements. Samples (1-25 microliters), as aerosols, were introduced into the high-frequency plasma torch by means of a heated nebulizer, and the emission was recorded spectrographically. Detection limits for various metals, including Al, Ba, Cu, Fe, Mg, Mn, Si, Ag, Ni, Ti, P and Pb, were in the range of 0.1 to 1 nanogram. At the 1.0 nanogram level, the precision was 5 percent. (Long-Battelle)
W73-00335

LIPID GEOCHEMISTRY OF A MISSISSIPPI COASTAL BOG ENVIRONMENT,
Louisiana State Univ., Baton Rouge.
For primary bibliographic entry see Field 02L.
W73-00340

ISOLATION OF CARBOHYDRATE-METABOLIZING, EXTREMELY HALOPHILIC BACTERIA,
Santa Clara Univ., Calif. Dept. of Biology.
G. A. Tomlinson, and L. I. Hochstein.
Canadian Journal of Microbiology, Vol 18, No 5, p 698-701, May 1972. 1 fig, 1 tab, 8 ref.

Descriptors: *Carbohydrates, *Pollutant identification, Gases, Organic compounds, Cultures, Hydrogen ion concentration, Isolation, Separation techniques, Salts, Systematics, *California.
Identifiers: *Halophilic bacteria, *Selective media, *Substrate utilization, *San Francisco Bay, Culture media, Halobacterium halobium, Halobacterium cutirubrum, Halobacterum salinarium, Glucose, Galactose, Lactose, Fructose, Sucrose, Bacterial physiology.

The isolation and physiological characteristics are outlined for some carbohydrate-metabolizing, extremely halophilic bacteria isolated from salterns in the San Francisco Bay area. These organisms required selective culturing on a carbohydrate-free medium (CFM) containing casamino acids, yeast extract, and various salts. The newly isolated strains, as well as other halophilic bacteria, were examined for their ability to form acid from various sugars in a CFM with no casamino acids and reduced yeast extract. By these procedures carbohydrate utilization was readily detected and was confirmed by determinations of residual sugar in the culture medium. Measurements of gas production proved insufficient for identification of these organisms. (Long-Battelle)
W73-00341

ASSAY OF CYCLOPROPENOID LIPIDS BY NUCLEAR MAGNETIC RESONANCE,
Oregon State Univ., Corvallis. Dept. of Food Science and Technology.
N. E. Pawlowski, J. E. Nixon, and R. O. Sinnhuber.
Journal of the American Oil Chemists' Society, Vol 49, No 6, p 387-392, June 1972. 8 fig, 4 tab, 18 ref.

Descriptors: *Acids, *Lipids, *Nuclear magnetic resonance, *Oil, Spectroscopy, Chemical analysis.
Identifiers: *Fatty acids, Cyclopropenoid fatty acids, Cyclopropene, Halphen assay, Plant oils, Precision, Detection limits.

A nuclear magnetic resonance (NMR) method for the quantitative analysis of cyclopropenoid fatty acids (CPFA) in lipids is described. Before analysis, the sample is diluted in an inert solvent, carbon tetrachloride being excellent for this purpose. This serves to decrease the viscosity of oil samples and to shift two solvent-dependent hydrogens on the 3 position of the cyclopropene ring up field from the methyl group. Any high resolution NMR is satisfactory for the analysis. However, it is necessary to draw a base line under each absorption and to measure the area precisely with a planimeter since the two peaks of interest are too close to use the instrument's integrator satisfactorily. Using this method, there is no need to transesterify or clean up natural lipid triglycerides. Analysis can be run on samples as small as 5 mg, although 30 mg is preferable. Lipids with as low as 1 percent cyclopropenoid can be measured. Any interfering substances present can also be seen, allowing judgment of the instrument's accuracy. At CPFA concentrations of 10 percent, the method is accurate to 0.5 percent. (Mortland-Battelle)
W73-00342

QUANTITATIVE AND SELECTIVE GAS CHROMATOGRAPHIC ANALYSIS OF DIMETHYL- AND TRIMETHYLAMINE IN FISH,
Oregon State Univ., Corvallis. Dept. of Food Science and Technology.
A. Miller, III, R. A. Scanlan, J. S. Lee, and L. M. Libbey.
Journal of Agriculture and Food Chemistry, Vol 20, No 3, p 709-711, May/June 1972. 3 fig, 1 tab, 19 ref.

Descriptors: Fish, *Gas chromatography, *Separation techniques, Marine animals, Marine fish, *Perch, Mass spectroscopy, Foods.
Identifiers: *Methylamines, Merluccius productus, Microstomus pacificus, Gadus macrocephalus, Sebastodes flavidus, Sebastodes alutus, Ophiodon elongatus, Pacific hake, Dover sole, Green rockfish, Ocean perch, Ling cod, Dimethylamines, Trimethylamines, Flame ionization, Biological samples, Sample preparation.

The selective gas chromatographic separation of methylamines was accomplished using columns containing Graphon and tetraethylenepentamine with an alkali flame ionization detector (AFID). Trimethylamine (TMA, 10 ppm) and dimethylamine (DMA, 50 ppm) added to fish were easily detected by equilibrium vapor analysis. Greater sensitivity (25 ppb TMA and 100 ppb DMA) was obtained by using the AFID in conjunction with a gas entrainment, on-column trapping procedure. The method is also useful for the analysis of other food products and biological materials. (Long-Battelle)
W73-00343

IDENTIFICATION OF NANOGRAM AMOUNTS OF CERTAIN ORGANOCHLORINE INSECTICIDES,
Oregon State Univ., Corvallis. Dept. of Food Science and Technology.
W. M. Kaufman, D. D. Bills, and E. J. Hannan.
Journal of Agriculture and Food Chemistry, Vol 20, No 3, p 628-631, May/June 1972. 4 fig, 3 tab, 12 ref.

Descriptors: *Pollutant identification, *Gas chromatography, Ultraviolet radiation, Irradiation, Bird eggs, Soil, Foods, Heptachlor, Aldrin, Dieldrin, DDT, DDD, DDE, Soil analysis, *Chlorinated hydrocarbon pesticides, *Insecticides.

Identifiers: Electron capture detector, Cleanup, Heptachlor epoxide, Fingerprints, Florisil technique, Biological samples, Metabolites.

A gas chromatographic procedure is described for identifying nanogram quantities of organochlorine pesticides in foods, soils, and osprey eggs. Electron capture was used to detect individual pesticides as they were trapped in a teflon capillary tube upon elution from the GC column. Fifty microliters of hexane were then added to the tube and the trapped component was irradiated with ultraviolet light for 15 to 120 seconds. The contents of the tube were then reinjected into the GC and the degradation pattern induced by UV radiation was recorded. Characteristic patterns, or 'fingerprints', were obtained for nanogram quantities of heptachlor, heptachlor epoxide, aldrin, dieldrin, and isomers of DDD, DDE, and DDT. The technique was then applied to food, soil, and egg samples utilizing a florisil column cleanup technique and using methylene chloride-petroleum ether as an eluting solvent. These analyses demonstrated the utility of the technique in identifying these insecticides in actual samples. The method is effective even when coextracted materials or artifacts are present. Even though such substances have retention times identical to those of certain insecticides, they do not give the characteristic 'fingerprint' of the insecticide upon irradiation. (Mortland-Battelle)
W73-00344

1,5-DI-BETA-NAPHTHYLTHIOCARBAZONE AS AN EXTRACTIVE INDICATOR FOR THE DETERMINATION OF CADMIUM WITH EDTA,
Delhi Univ. (India). Dept. of Chemistry.
S. K. Sindhwani, Y. Dutt, and R. P. Singh.
Zeitschrift fur Analytische Chemie, Vol 258, No 5, p 366-367, May 16, 1972. 2 ref.

Descriptors: *Separation techniques, *Colorimetry, *Indicators, *Cadmium, Chelation, Cadmium, Lead, Zinc, Anions, Chlorides, Bromides, Iodides, Phosphates, Fluorides, Sulphates, Nitrites, Chromium, Beryllium, Strontium, Calcium, Mercury, Zinc, Copper, Nickel, Cobalt, Iron, Volumetric analysis, Heavy metals.
Identifiers: *EDTA, *1,5-di-beta-naphthylthiocarbazone, Chemical interference, Oxalates, Thiosulphates, Borates, Thiocyanates, Citrates, Tartarates, Perchlorates, Barium, Dithizone, Sample preparation, Precision, Detection limits.

A colorimetric procedure, involving formation of colored complexes extractable into chloroform and carbon tetrachloride, was used to determine Cd in solution. The recommended procedure involves titrating a prepared Cd solution into a mixture of EDTA, buffer, and 1,5-di-beta-naphthylthiocarbazone until the indicator changes from a green to pink. Accurate results are obtained in the pH range 4.8 to 6.0. The precision obtained by the proposed method is higher than with dithizone, whereas the sensitivity is comparable (0.0010 micrograms and 0.0012 micrograms for log I sub-zero per I equals 0.001). The following foreign ions did not interfere: thiosulphate, borate, thiocyanate, chloride, bromide, iodide, citrate, tartrate, phosphate, fluoride, sulphate, perchlorate, nitrite, chromium, beryllium, barium, strontium and calcium. Out of the common anions only oxalate interferes. Attempts to mask mercury, zinc, copper, lead, nickel, cobalt and iron were unsuccessful. (Long-Battelle)
W73-00346

THE ATOMIC FLUORESCENCE CHARACTERISTICS AND DETERMINATION OF CHROMIUM IN AN ARGON-SEPARATED AIR--ACETYLENE FLAME,
Imperial Coll. of Science and Technology, London (England). Dept. of Chemistry.
J. D. Norris, and T. S. West.
Analytica Chimica Acta, Vol 59, No 3, p 355-361, May 1972. 1 fig, 3 tab, 22 ref.

Descriptors: *Chromium, Heavy metals, Laboratory equipment, Silver, Aluminum, Gold, Beryllium, Calcium, Cadmium, Cerium, Cobalt, Copper, Fluorine, Iron, Mercury, Potassium, Magnesium, Manganese, Molybdenum, Sodium, Nickel, Phosphorus, Lead, Sulfur, Zinc, Instrumentation, Water analysis, Calibration.
Identifiers: *Atomic fluorescence spectroscopy, *Detection limits, *Thermal emission, *Electrodeless discharge lamps, Chemical interference, Arsenic, Boron, Barium, Bismuth, Columbium, Tin, Thallium, Vanadium, Tungsten, Zirconium, Sample preparation, Calibration curves.

An electrodeless discharge lamp containing Cr chloride was used in conjunction with an atomic fluorescence spectrophotometer equipped with an argon-separated air-acetylene flame to determine Cr in aqueous solutions. The best detection limit for atomic fluorescence was 0.005 p.p.m. at 359 nm and that for thermal emission was 0.02 p.p.m. for the combined 425.4 nm, 427.5 nm, and 428.9 nm lines. The calibration curve for the atomic fluorescence of Cr at 359 nm is linear between 0.01 and 50 p.p.m. Of 38 elements examined for interference in 250-fold amounts (by weight) in the fuel-lean separated flame, only three (Ce, Si, and Ti) produce a slight positive interference of 4 to 6 percent. Many more elements interfere in the thermal emission of Cr. (Long-Battelle)
W73-00351

EVALUATION OF PLATING MEDIA AND TEMPERATURE PARAMETERS IN THE ISOLATION OF SELECTED ENTERIC PATHOGENS,
Springfield Coll., Mass. Dept. of Biology.
C. K. Wun, J. R. Cohen, and W. Litsky.
Health Laboratory Science, Vol 9, No 3, p 225-232, July 1972. 4 tab, 15 ref.

Descriptors: *Pathogenic bacteria, *Enteric bacteria, *Cultures, *Isolation, Salmonella, Shigella, Temperature, Pseudomonas, Methodology, Nutrients, Pollutant identification.
Identifiers: *Culture media, *Selective media, Pseudomonas aeruginosa, Emrichment, Recovery, Agars, Salmonella typhimurium, Salmonella typhimurium var copenhagen, Salmonella thompson, Salmonella newington, Salmonella typhi, Shigella sonnei, Shigella flexneri.

The selective and nutritive value of media commonly used for the isolation of enteric pathogens was studied using Salmonellae and Shigellae in pure and mixed cultures. The purpose was to establish the most productive combination of media and temperature for the isolation of enteric pathogens. The selective and differential values of Hektoen Enteric Agar (HE), Xylose Lysine Deoxycholate Agar (XLD), Salmonella-Shigella Agar (SS), and Eosin Methylene Blue Agar (EMB) incubated at temperatures of 37 C and 41.5 C were compared when Hajna's Gram-Negative broth (GN) was used as an enrichment medium. In view of the observations of atypical colonies on these selective media and the difficulty in interpreting the true efficiencies of growth inhibition and/or stimulation, the use of any of these media alone is not justified. It is suggested that HE and XLD media be used for primary isolation from clinical specimens and their use be paralleled by enrichment in GN followed by secondary plating on HE and XLD. Necessity for standardization of methods and careful observation of plates is emphasized. Coordination of all variables should minimize 'false negative' enteric cultures. (Snyder-Battelle)
W73-00352

TITRIMETRIC DETERMINATION OF COBALT (II) WITH EDTA USING 1- (2-PYRIDYLAZO)-2-PHENANTHROL (PAP) AS A VISUAL INDICATOR,
Delhi Univ. (India). Dept. of Chemistry.
A. K. Rishi, B. S. Garg, and R. P. Singh.
Zeitschrift fur Analytische Chemie, Vol 259, No 4, p 288, May 5, 1972. 2 ref.

Descriptors: *Cobalt, *Volumetric analysis, Heavy metals, Chemical analysis, Chlorine, Bromine, Iodine, Nitrates, Phosphates, Sulfates, Nitrites, Calcium, Magnesium, Strontium, Ions, Manganese, Cadmium, Aluminum, Mercury, Copper, Iron.
Identifiers: Chemical interference, *1- (2-pyridylazo)-2-phenanthrol, *EDTA, Citrates, Oxalates, Tartrates, Thiourea, Thiosulfates, Sulfites, Borates, Iodates, Barium, Sensitivity.

1- (2-pyridylazo)-2-phenanthrol (PAP) is useful as a visual indicator for the titrimetric determination of cobalt with EDTA. The procedure involves pipetting out 5 ml of 0.1 M EDTA solution into a ground-glass flask, buffering to pH 5.5 with sodium acetate-acetic acid buffer, and adding two drops of indicator solution (0.01 M in dioxan). The cobalt solution is then added to the titrant and shaken. A sharp color change from yellow to pink indicates the end-point. The sensitivity equals 0.0020 micrograms Co per cm for log I sub o/I equal to 0.001. No interferences resulted from Cl, Br, I, NO3, PO4, citrate, oxalate, tartrate, thiourea, sulfate, thiosulfate, sulfite, borate, iodate, nitrite, Ca, Mg, Ba, Sr, or Mn ions. Interferences from Cd, Al, Hg, Cu, and Fe could be masked. (Snyder-Battelle)
W73-00354

FLUOROMETRIC DETERMINATION OF SELENIUM IN EFFLUENT STREAMS WITH 2,3-DIAMINONAPHTHALENE,
Abbott Labs., North Chicago, Ill. Analytical Research Dept.
J. A. Raihle.
Environmental Science and Technology, Vol 6, No 7, p 621-622, July 1972. 2 tab, 10 ref.

Descriptors: *Fluorometry, *Effluents, *Pollutant identification, Trace elements, Chemical analysis, Water analysis, Heavy metals, Inorganic compounds, Chemical reactions, Fluorescence, Oxidation, Separation techniques, Effluent streams, Industrial wastes.
Identifiers: *Selenium, Selenious acid, Selenates, Selenites, 2 3-Diaminonaphthalene, Chemical interference, Detection limits, Sample preparation.

A fluorometric technique is described for determining selenium in effluent streams based on the reaction of selenious acid with 2,3-diaminonaphthalene in acid solution. This reaction forms naphtho- (2,3-d)-2-selena-1,3-diazole. A bromine-bromide redox buffer is used to convert elemental selenium to selenious acid prior to the addition of 2,3-diaminonaphthalene. The extraction procedure is described in detail. Fluorescent intensity is determined at 522 nm when excited at 366 nm on an Aminco-Bowman spectrophotofluorometer. The procedure is sensitive to selenium (O) and selenium (IV). Common substances found in effluent streams, particularly nitrates, are non-interfering at a level of 0.05mM. Fluorescent intensity versus concentration plots are practically linear between 0.05 and 0.20 micrograms and are practically free from reagent interference in both standard solutions and spiked effluent samples. Analyses of elemental selenium show a conversion equivalent to 2500 ppb in effluent streams. (Mortland-Battelle)
W73-00355

COMPARISON OF NEUTRON ACTIVATION ANALYSIS AND OTHER ANALYSES PROCEDURES FOR FISH SAMPLES,
Kansas State Univ., Manhattan.
N. D. Eckhoff, C. J. Pappas, and C. W. Deyoe.

Analytical Chemistry, Vol 44, No 8, p 1506-1507, July 1972. 1 tab, 2 ref.

Descriptors: *Neutron activation analysis, *Colorimetry, Fish, Evaluation, Chemical analysis, Potassium, Sodium, Manganese, Calcium, Chlorine, Phosphorus, Bioassay, Radioactivity techniques, Methodology, Mineralogy, Pollutant identification, Alkaline earth metals, Alkali metals, Halogens.
Identifiers: *Atomic absorption spectrophotometry, *Biological samples, Bone, Spectrophotometry, Sample preparation, Bremstrahlung spectra.

Results from the neutron activation analysis (NAA) of 3 fish bone and 3 total fish samples were compared with those obtained from atomic absorption spectrophotometry (AAS) and colorimetry. No special preparation was necessary for the NAA procedure; however, a dry ashing procedure was used in preparing samples for the other analyses. Diluted samples were analyzed for minerals by AAS and for phosphorus by colorimetry which was based on the bremstrahlung spectrum collected for a 10-min period. A time series of these bremstrahlung spectra was collected over a week period to confirm the presence of P-32 by half life comparison. The NAA results for Ca illustrate the importance of the weighting factor matrix to obtain the proper estimate. Using a spectrum with a large amount of Ca as the weighting factor to estimate Ca in a spectrum with a significantly smaller amount of Ca would produce inaccurate estimates. The converse apparently is not true for Ca. The results for Na, K, Mn, and Cl appear to be unaffected by the choice of weighting factors. The time series bremstrahlung spectra revealed a half life of approximately 14 days. The comparison of the phosphorus results is fair. The time savings for computation, using the approximate weighting factor matrix, were as follows: NAA-1 equals 0.32 minutes/sample, NAA-3 equals 0.14 minutes/sample, which gives a time savings ratio, SR (NAA-1/NAA-3), of 2.286. The very significant time savings ratio strongly suggests the use of the approximate weighting factor for the analysis of these fish samples. (Snyder-Battelle)
W73-00356

INEXPENSIVE ABSORPTION CELL FOR USE IN THE DETERMINATION OF MERCURY BY THE FLAMELESS ATOMIC ABSORPTION TECHNIQUE,
Bituminous Coal Research, Inc., Monroeville, Pa.
D. R. Wolber, and R. E. Bosshart.
Analytical Chemistry, Vol 44, No 8, p 1546, July 1972. 1 fig, 2 ref.

Descriptors: Laboratory equipment, Construction materials, *Mercury, *Spectrophotometers, Design, *Instrumentation, Analytical techniques, Heavy metals.
Identifiers: *Absorption cell, *Atomic absorption spectrophotometry.

An inexpensive absorption cell for determination of mercury by flameless atomic absorption consists of a plexiglas tube fitted with inlet and outlet holes and window holders to hold quartz viewing windows. The quartz window holders can be easily removed to facilitate cleaning and to interchange cells to obtain various path lengths. (Snyder-Battelle)
W73-00357

A LOW TEMPERATURE CLEANUP PROCEDURE FOR PESTICIDES AND THEIR METABOLITES IN BIOLOGICAL SAMPLES,
Department of National Health and Welfare, Ottawa (Ontario). Food and Drug Research Lab.
H. A. McLeod, and P. J. Wales.
Journal of Agriculture and Food Chemistry, Vol 20, No 3, p 624-627, May/June 1972. 1 fig, 5 tab, 13 ref.

Descriptors: *Pesticides, *Plant tissue, Fungicides, Herbicides, Pesticide residues, Pesticide removal, Bioassay, Chemical precipitation, Lipids, Water, Solvent extractions, Separation techniques, Filtration, Cellulose, Flame photometry, Water pollution, Pollutant identification, Organic compounds, Grains (Crops), Temperature, Carbon, Diazinon, 2 4-D.
Identifiers: *Cleanup, *Metabolites, *Animal tissues, Paraoxon, Waxes, Polar pesticides, Apolar pesticides, Acetone-benzene, Refluxing, Gas liquid chromatography, Electron capture gas chromatography, Captan, 2 4-D acid, 2 4-D isopropyl ester, Endosulfan, Malathion, Parathion, Fenitrooxon, Fenitrothion, Phosphamidon, Dinitrobutyl phenol anisole, Malaoxon, Biological samples, Liver, Kidney.

A low temperature cleanup procedure was developed to separate in one operation some polar and apolar pesticides from sample lipid, waxes, and water. The optimum analytical parameters, including recovery data, for pesticides and metabolites representative of insecticides, fungicides, and herbicides added to biological samples are given. Stock solutions of each pesticide and animal and plant tissue samples were prepared. Samples were extracted by refluxing with acetone-benzene (19 plus 1), and extracts were cleaned up by low temperature precipitation at 178 C. A precipitation time of 30 minutes followed by filtration through Solka Floc (cellulose) was optimum. The water content of the extract did not adversely affect the recovery of polar residues, but the presence of carbon in the filtration did. The cleaned-up extracts were suitable for gas-liquid chromatographic determination with electron capture and flame photometric detectors. Recoveries of thirteen representative insecticides, fungicides, and herbicides (captan, diazinon, dinitrobutyl phenol anisole, 2,4-D acid, 2,4-D isopropyl ester, endosulfan, malathion, malaoxon, parathion, paraoxon, phosphamidon, fenitrothion, and fenitroxon) ranged from 80-116 percent when added separately or in combination to samples of carrots, peas, wheat, human fat, liver, and kidney. (Byrd-Battelle)
W73-00358

THE ANODIC BEHAVIOUR OF ZINC IN AQUEOUS SOLUTION – III. PASSIVATION IN MIXED KF--KOH SOLUTIONS,
Calvin Coll., Grand Rapids, Mich. Dept. of Chemistry.
T. P. Dirkse, and N. A. Hampson.
Electrochimica Acta, Vol 17, No 5, p 813-818, May 1972. 5 fig, 1 tab, 12 ref.

Descriptors: *Zinc, *Aqueous solutions, *Electrodes, Alkalis (Bases), Ion exchange, Hydration, Salts, Potassium compounds, Density currents, Electrochemistry, Kinetics.
Identifiers: Potassium hydroxide, Ion selective electrodes, Potassium fluoride, Transition time.

An investigation was conducted on the effect of total ionic concentration on the transition time/current density relation of zinc electrode reactivity in alkalis. The effect of inert salt on electrode reactivity was studied. Potassium fluoride was used as the inert salt due to its solubility in water and because it is isoelectronic with the hydroxide ion. Experiments were conducted in a series of electrolyte solutions to cover a range of potassium hydroxide/water ratios 0.99-0.13, in the ionic concentration range up to 15 mol/l. The results indicated that at a constant ionic concentration, an increase in KOH increases the transition time. At constant KOH, an increase in ionic concentration decreases the transition time. The maximum values observed in transition time/KOH correlations are satisfactorily accounted for by these two effects. (Mortland-Battelle)
W73-00359

INDUCTION FURNACE METHOD IN ATOMIC SPECTROMETRY,
Cornell Univ., Ithaca, N. Y. Dept. of Chemistry.
Y. Talmi, and G. H. Morrison.
Analytical Chemistry, Vol 44, No 8, p 1455-1466, July 1972. 11 fig, 7 tab, 33 ref.

Descriptors: *Spectrometers, Gases, Helium, Temperature, Zinc, Mercury, Water pollution, Pollutant identification, Magnesium, Cadmium, Absorption, Heavy metals.
Identifiers: *Atomic emission spectrophotometry, *Atomic absorption spectrophotometry, *Induction furnaces, *Vaporization, *Atomization, Dissociation, Excitation, Helium plasma, Silver, Chemical interference, Detection limits.

A source is described for the direct analysis of solids or evaporated solutions by atomic emission and absorption spectrometry. An induction heated graphite crucible serves as a thermal means of vaporization and atomization, while excitation of the atomized sample is achieved mainly by the helium plasma formed by the RF induction furnace field. The processes involved include vaporization, dissociation and compound formation, elimination of the vaporized sample, and excitation parameters of the plasma. Parameters influencing absorption and emission are discussed and methods for suppressing the interference of one mode on the other are presented. Factors influencing sensitivity are described and methods of optimization given. Sources of interference are also presented. Accuracy on the order of 5 percent has been obtained with microsamples of geological, metallurgical, and biological materials, and relative sensitivities of 0.0001 to 0.000001 percent and better have been achieved. Since a new sample can be introduced every 30-60 seconds, the method is well suited to routine analyses. (Byrd-Battelle)
W73-00360

RAPID DETERMINATION OF TWENTY AMINO ACIDS BY GAS CHROMATOGRAPHY,
Jet Propulsion Lab., Pasadena, Calif.
J. P. Hardy, and S. L. Kerrin.
Analytical Chemistry, Vol 44, No 8, p 1497-1499, July 1972. 1 fig, 7 ref.

Descriptors: *Amino acids, *Gas chromatography, *Methodology, *Pollutant identification, Organic compounds, Chemical reactions, Chemical analysis, Volatility.
Identifiers: Trimethylsilyl, N-trimethylsilyl-O-n-butyl esters, Alanine, Glycine, Valine, Leucine, Isoleucine, Proline, Serine, Threonine, Hydroxyproline, Methionine, Cysteine, Cystine, Arginine, Phenylalanine, Aspartic acid, Lysine, Glutamic acid, Tyrosine, Histidien, Tryptophan, Sample preparation.

The following procedure can be used for the preparation of volatile N-trimethylsilyl-O-n-butyl ester (TMSi-butyl) derivatives of 20 amino acids: (1) evaporate 1 ml of 2.5 mM amino acid solution to dryness under a stream of dry N2 at 50 C in an oil bath; (2) esterify the residue with butanol/3N HCl for 15 min at 150 C and evaporate as before; and (3) trimethylsilylate the esterhydrochlorides with 0.5 ml each of BSTFA and methyl cyanide or chloride at 150 C for 90 min. The entire chromatographic analysis of 1-microliter quantities takes less than 35 min. (Snyder-Battelle)
W73-00362

SEPARATION AND IDENTIFICATION OF MULTICOMPONENT MIXTURES USING CENTRI-CHROMATOGRAPHY/MASS SPECTROMETRY,
Waterloo Univ. (Ontario).
F. W. Karasek, and P. W. Rasmussen.
Analytical Chemistry, Vol 44, No 8, p 1488-1490, July 1972. 3 fig, 2 tab, 11 ref.

Descriptors: *Mass spectrometry, *Mixtures, *Organic compounds, *Separation techniques, *Aqueous solutions, Centrifugation, Instrumentation, Methodology, Pollutant identification, Chemical analysis, Heat resistance, Spectrometers, Gels, Silica, Fluorescence.
Identifiers: *Centri-chromatography, Solid-liquid chromatography, Precision, Mass spectra, Organic solvents, Sample preparation, Anthracene, N-methyl-2 3-diphenylindole, Alpha-methyl stilbene, Coumarin, 2 5-diphenylthiadiazole, 2 5-diphenyloxadiazole, N-benzolbenzophenone imine, Dicyclopropyl ketone ozine.

The combination of centrifugal microparticulate bed chromatography and mass spectrometry provides a fast accurate method of separating and identifying components in a mixture without the necessity of isolation and purification after chromatogrphy. The instruments used were a prototype of the Centri-Chromatography apparatus and a Hitachi Perkin-Elmer single focusing mass spectrometer. The columns were packed with microparticulate silica and developed with hexane-benzene mixtures. Anthracene and N-methyl-2,3-diphenylindole were placed on a column, extruded and dried, and the resulting bands examined under ultraviolet light. In order to prevent errors, consideration should be given to compounds strongly adsorbed by silica, such as alcohols and amines, that require a high volitilization temperature and to water which reduces the separating efficiency of the chromatograph. (Long-Battelle)
W73-00363

DETERMINATION OF MASS SPECTROMETRIC SENSITIVITY DATA FOR HYDROAROMATIC COMPOUNDS,
Bureau of Mines, Pittsburgh, Pa. Pittsburgh Energy Research Center.
J. L. Shultz, A. G. Sharkey, Jr., and R. A. Brown.
Analytical Chemistry, Vol 44, No 8, p 1486-1487, July 1972. 1 fig, 1 tab, 4 ref.

Descriptors: *Mass spectrometry, Organic compounds, *Aromatic compounds, Equations, Mathematics, Pollutant identification, Fuels, Coals, Methodology, Kinetics.
Identifiers: *Hydroaromatic compounds, Sensitivity, Aromatic hydrocarbons, Tetrahydronaphthalene, Octahydronaphthalene, Decahydronaphthalene, 9 10-Dihydroanthracene, 9 10-Dihydrophenanthrene, Octahydrophenanthrene, Dihydropyrene, Tetrahydropyrene, Hexahydropyrene, Dodecahydropyrene, Hexadecahydropyrene, Octahydrocoronene, Docosahydrocoronene, Tetracosahydrocoronene.

An alternative to the low-voltage mass spectrometric analysis of hydroaromatic compounds based on molecular ion sensitivities is mass spectrometric analysis based on the prediction of sensitivities of such compounds from the corresponding aromatic ring (parent) compound. This alternative approach is based on the behavior of a total of 15 hydroaromatic compounds analyzed by the Bureau of Mines and Esso. The relationship between the sensitivities of hydroaromatic compounds and their parent aromatic ring systems is illustrated mathematically. The decrease in reciprocal molecular weight of a hydroaromatic (or perhydroaromatic) compound relative to the romatic ring system is determined (x) and the sensitivity of the hydroaromatic read from the curve or calculated from the equation in terms of percent of the sensitivity of the parent aromatic ring system (y). Since no attempt was made to standardize operating parameters such as ionizing voltage, electron current, or source temperature, the influence of inlet temperature on relative sensitivity behavior is not critical. Sensitivity data calculated from the two equations presented should be comparable to low-ionizing voltage sensitivity data for other classes of compounds and permit semi-quantitative analyses accurate to plus or minus 10 percent of the amount present. (Snyder-Battelle)
W73-00364

MARINE GAMMARIDEA (CRUSTACEA: AMPHIPODA) FROM THE INDIAN REGION. FAMILY AMPHITHOIDAE,
Kerala Univ., Trivandrum (India). Marine Biology Lab.
P. Rabindranath.
Marine Biology, Vol 14, No 2, p 161-178, May 1972. 9 fig, 45 ref.

Descriptors: *Crustaceans, *Amphipoda, *Marine animals, Invertebrates, Systematics, Seawater, Pollutant identification, Sampling.
Identifiers: Ampithoe (Pleonexes) auriculata, Ampithoe (Ampithoe) serraticauda, Cymadusa imbroglio, Ampithoe (Ampithoe) ramondi, Cymadusa filosa, Ampithoe (Ampithoe) kergueleni, Sample preparation, *Gulf of Mannar (India).

Six species of marine gammaridean amphipods belonging to the family Ampithoidae are discussed. The specimens described were collected from Mandapam (Gulf of Mannar), India and Thankasserry (Quilon, Kerala), India. The collection includes 3 new species, namely Ampithoe (Ampithoe) serraticauda, Ampithoe (Pleonexes) auriculata and Cymadusa imbroglio. Ampithoe (Ampithoe) kergueleni Stebbing (1888) is a new record for this region, while Ampithoe (Ampithoe) ramondi Audouin (1826) and Cymadusa filosa savigny (1816), the two well-known tropicopolitan members, are briefly redescribed. The study supports Barnard's (1970) contention that the genus Pleonexes bate (1857) (since reduced to subgeneric status under the genus Ampithoe Leach, 1814) represents only 'a grade of evolution', but suggests that the structure of the first maxillary and mandibular palps and the outer lobes of the lower lip should also be taken into consideration, in combination with the telsonic processes, for distinguishing Pleonexes from Ampithoe. Based on this concept, a reappraisal of some of the species of the genera is suggested. The subgenus Ampithoe is created to hold those species of Ampithoe showing typical characteristics of the genus. (Long-Battelle)
W73-00365

ENVIRONMENTAL FACTORS AFFECTING THE STANDING CROP OF FORAMINIFERA IN SUBLITTORAL AND PSAMMOLITTORAL COMMUNITIES OF A LONG ISLAND SALT MARSH,
City Coll., New York. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W73-00367

SOME EFFECTS OF TEMPERATURE ON THE GROWTH AND METABOLIC RATE OF JUVENILE BLUE CRABS, CALLINECTES SAPIDUS, IN THE LABORATORY,
Florida Univ., Gainesville. Dept. of Zoology.
C. W. Leffler.
Marine Biology, Vol 14, No 2, p 104-110, May 1972. 6 fig, 3 tab, 20 ref.

Descriptors: Water pollution effects, *Thermal pollution, *Marine animals, *Water temperature, *Growth rates, Bioassay, Animal metabolism, Mortality, Thermal properties, Crabs, Invertebrates, Marine animals, Commercial shellfish, Juvenile growth stage, Sea water, Growth stages, Life cycles, Lethal limit.
Identifiers: *Blue crabs, *Metabolic rates, Callinectes sapidus, Sample preparation, Macroinvertebrates.

Juvenile blue crabs, Callinectes sapidus, were grown in the laboratory to determine possible temperature effects that might occur within a thermally polluted environment. The effects of temperature on growth rate, adult size, mortality rate, metabolic rate, and gross activity were determined for crabs exposed to temperatures of 34, 27, 20, 15, and 13 C. Growth is shown to be dependent upon temperature since crabs kept at 34 and 27 C grew faster than those kept at the lower temperatures. Other results observed in these tests include: (1) Increase in size per molt is less at high temperatures than at lower ones. (2) Mortality is directly proportional to temperature between 13 and 34 C and is very high during ecdysis at elevated temperatures. (3) Metabolic rate increases with temperature, but various degrees of acclimation are seen after 4 weeks of exposure. (4) No acclimation of general activity to temperature was found. (Long-Battelle)
W73-00368

INFLUENCE OF ENVIRONMENTAL PARAMETERS ON INTRASPECIFIC VARIATION IN FUCUS VESICULOSUS,
Maine Univ., Orono. Dept. of Oceanography; and Maine Univ., Orono. Dept. of Zoology.
For primary bibliographic entry see Field 05C.
W73-00369

DENSITY-GRADIENT CENTRIFUGATION AS AN AID TO SORTING PLANKTONIC ORGANISMS. I. GRADIENT MATERIALS,
Marine Biological Lab., Woods Hole, Mass.
R. A. Bowen, J. M. St. Onge, J. B. Colton, Jr., and C. A. Price.
Marine Biology, Vol 14, No 3, p 242-247, June 1972. 5 fig, 11 ref.

Descriptors: *Zooplankton, *Larvae, *Fish eggs, *Separation techniques, *Marine fish, Silica, Marine algae, Invertebrates, Isolation, Refractivity, Copepods, Marine animals, Mollusks, Gastropods, Phaeophyta.
*Density-gradient centrifugation, Isopycnic centrifugation, Sample preservation, Salpa, Ludox AM, Sucrose, Density gradients, Tunicates, Phaeocystis, Sorting, Sodium bromide, Dextran, Oikopleura, Sagitta, Pteropods, Euphausiids, Gadus morhua, Urophycis.

Density-gradient centrifugation was studied as an aid to the sorting of ichthyoplankton and it was shown that fish eggs and larvae can be separated by this method using gradients of sucrose or silica. Preserved samples were layered over linear gradients in 100 cc swinging buckets and centrifuged for 1 hr at 1000 rpm. In the sucrose gradients, zooplankton were confined to two ends of the gradient and the fish eggs to an intermediate zone. Using silica gradients, in the form of Ludox AM, the fish eggs banded in one narrow zone, the fish larvae in another, and nearly all of the invertebrate plankton were between. Both sodium bromide and dextran gradients were also tried but proved unsuitable. Six classes of zooplankton were studied and only Salpa overlapped appreciably with fish eggs. There was no overlap with larvae. The Ludox AM gradient was found to offer the most advantages. (Mortland-Battelle)
W73-00371

STUDIES OF MARINE FOULING AND BORING OFF KODIAK ISLAND, ALASKA,
Naval Oceanographic Office, Washington, D. C.
E. R. Long.
Marine Biology, Vol 14, No 1, p 52-57, May 1972. 3 fig, 3 tab, 15 ref.

Descriptors: *Fouling, *Artificial substrates, Depth, *Sampling, *Periphyton, Equipment, Tubificids, Mollusks, Water temperature, Marine animals, Alaska, Biomass, Salinity, Benthic fauna, Asbestos, Inorganic compounds, Worms, Invertebrates, Annelids, Seasonal, Crustaceans, Isopods, Marine algae, *Alaska.
Identifiers: *Wood borers, Barnacles, Bryozoas, Hydroids, Sponges, Coelenterates, Porifera, Polychaetes, Serpulids.

Marine fouling and boring off Kodiak Island, Alaska, was studied at depths of 5, 15, and 30 m by exposing wood/asbestos test panels and retrieving them at monthly and cumulatively longer intervals. Fouling was moderate between June and October and negligible between November and May. The fouling communities at 15 and 30 m were quite dissimilar, probably due to a large surface-to-bottom salinity gradient. The community at the 30 m level was dominated by Balanus crenatus and Pseudochitinopoma occidentalis, that at 15 m by Alcyonidium polyoum and Obelia borealis. At the 5 m deep, pierside site, the most common organisms were B. crenatus, O. borealis and Desmacystis sandalia. Borer attack was a trace at 5 and 15 m and slightly more severe at 30 m. (Snyder-Battelle)
W73-00374

GONIADELLA GRACILIS, A POLYCHAETE NEW TO BRITISH SEAS,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
A. J. M. Walker.
Marine Biology, Vol 14, No 1, p 85-87, May 1972. 2 tab, 16 ref.

Descriptors: *Annelids, *Systematics, Worms, Invertebrates, Sea water, Distribution patterns, Africa, Depth.
Identifiers: *Goniadella gracilis, South Africa, *Liverpool Bay (England).

Polychaetes of the genus Goniadella Hartman were found in Liverpool Bay, England, in sand and sandy gravel below depths of 15 m. The worms had most of the characteristics of G. gracilis (Verrill), a species previously recorded only from eastern North America and South Africa. (Long-Battelle)
W73-00376

TEMPERATURE-INDUCED CHANGES IN THE FORMATION OF SULPHIDE IN A MARINE SEDIMENT,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
For primary bibliographic entry see Field 05B.
W73-00377

THE POSSIBLE IMPORTANCE OF FECAL MATERIAL IN THE BIOLOGICAL AMPLIFICATION OF TRACE AND HEAVY METALS,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
For primary bibliographic entry see Field 05B.
W73-00381

SALMONELLA TESTING OF POOLED PRE-ENRICHMENT BROTH CULTURES FOR SCREENING MULTIPLE FOOD SAMPLES,
Procter and Gamble Co., Cincinnati, Ohio. Winton Hill Technical Center.
W. R. Price, R. A. Olsen, and J. E. Hunter.
Applied Microbiology, Vol 23, No 4, p 679-682, April 1972. 1 fig, 3 tab, 4 ref.

Descriptors: *Salmonella, *Foods, *Pollutant identification, Cultures, Sampling, Methodology, Water pollution sources, Aerobic bacteria, Enteric bacteria, Pseudomonas, Milk.
Identifiers: *Culture media, Enrichment, Biochemical tests, Chi-square test, Salmonella braenderup, Salmonella spp, Salmonella cubana, Salmonella anatum, Salmonella binza, Salmonella tennessee, Salmonella worthington, Proteus, Citrobacter freundii.

A method is presented for testing multiple food samples for Salmonella. The method pools multiple pre-enrichment broth cultures into single enrichment selenite and tetrathionate broths. The subsequent stages of the Salmonella analysis are not altered. The method was found applicable to several dry food materials including nonfat dry milk, dried egg albumin, cocoa, cottonseed flour, wheat flour, and shredded coconut. As many as 25 pre-enrichment broth cultures were pooled without apparent loss in the sensitivity of Salmonella detection as compared to individual sample analysis. The procedure offers a simple, yet effective, way to increase sample capacity in the Salmonella testing of foods, particularly where a large proportion of samples ordinarily is negative. It also permits small portions of pre-enrichment broth cultures to be retained for subsequent individual analysis if positive tests are found. (Long-Battelle)
W73-00383

SELECTIVITY STUDIES ON ANION-SELECTIVE MEMBRANE ELECTRODES,
Uppsala Univ. (Sweden). Medical Centre.
For primary bibliographic entry see Field 02K.
W73-00392

THE BDELLOVIBRIOS,
California Univ., Davis. Dept. of Bacteriology.
M. P. Starr, and R. J. Seidler.
Annual Review of Microbiology, Vol 25, p 649-678, 1971. 109 ref.

Descriptors: *Ecology, Animal parasites, Aquatic bacteria, Hosts, Water pollution, Sewage bacteria, Soil bacteria, Soils, Water pollution sources, Cultures, Methodology, Isolation, Systematics, *Reviews.
Identifiers: *Bdellovibrio, Streptomycin, Mutants, Enumeration.

One portion of this review concerns ecological studies of both host-dependent and host-independent Bdellovibrios. Procedures for the isolation and enumeration of host-dependent Bdellovibrios from natural habitats rely on the property of the relatively small cell size (narrow width; low mass) of the parasites. Bdellovibrios have been reported from a great variety of habitats including soil and sewage, rivers, and the marine environment. Host-independent Bdellovibrios may be routinely obtained by isolating the spontaneous streptomycin-resistant mutants, followed by their propagation on a streptomycin-sensitive host. In this manner, large numbers of streptomycin-resistant Bdellovibrio cells can be transferred to a selective medium containing streptomycin for isolation of the host-independent cells. (Byrd-Battelle)
W73-00393

DETERMINATION OF LEAD IN FISH BY ATOMIC ABSORPTION SPECTROPHOTOMETRY AND BY POLAROGRAPHY. I. DEVELOPMENT OF THE METHODS,
Food and Drug Administration, Washington, D.C.
R. J. Gajan, and D. Larry.
Journal of the Association of Official Analytical Chemists, Vol 55, No 4, p 727-732, July 1972. 4 tab, 15 ref.

Descriptors: *Polarographic analysis, *Lead, *Freshwater fish, *Marine fish, Heavy metals, Water pollution, *Pollutant identification, Salmon, Trace elements, Methodology, Cat fishes, Perches, Suckers, Carp, Chemical analysis.
Identifiers: *Atomic absorption spectrophotometry, Dry-ashing, Biological samples, Sample preparation, Sheepshead, Coho salmon, Chemical recovery.

A method for the determination of lead in fish by atomic absorption spectrophotometry and polarography is described. The samples were dry-ashed at 500 C and dissolved in IN HCl; lead was determined by both methods. Good agreement between atomic absorption spectrophotometry and polarography was obtained at levels of 1.0 to 10.0 ppm. Over this range the recoveries averaged 96.1 percent for polarography and 93.8 percent for atomic absorption spectrophotometry. Twelve species of fresh and salt water fish were analyzed. (See also W73-00395) (Byrd-Battelle)
W73-00394

DETERMINATION OF LEAD IN FISH BY ATOMIC ABSORPTION SPECTROPHOTOMETRY AND BY POLAROGRAPHY. II. COLLABORATIVE STUDY,
Food and Drug Administration, Washington, D.C.
R. J. Gajan, and D. Larry.
Journal of the Association of Official Analytical Chemists, Vol 55, No 4, p 733-736, July 1972. 4 tab.

Descriptors: *Lead, *Fish, *Polarographic analysis, *Pollutant identification, Chemical analysis, Heavy metals, Water pollution sources, Statistics, Mathematical studies, Methodology, Trace elements.
Identifiers: *Atomic absorption spectrophotometry, Dry ashing, Sample preparation, Interlaboratory tests, Collaborative studies, Data interpretation.

A dry-ashing technique in conjunction with atomic absorption spectrophotometry and polarography was employed by 19 laboratories to determine lead in fish at levels of 1-11 ppm. Each collaborator was given 400 g raw fish, 8 solutions of unknown Pb concentration (0-11 ppm), a known spiking solution (40 micrograms/ml), and instructions. Eight samples (25 g) were prepared by spiking with 1 ml of an unknown concentration, analyzed, and compared to the results for known spiked samples. The average lead recoveries from 6 paired samples at 1-2, 5-6, and 10-11 ppm levels were 97.7 percent by polarography and 100.7 percent by atomic absorption. The average standard deviations were 0.32 and 0.41 ppm, respectively, and the average coefficients of variation were 7.9 and 13.1 percent, respectively. With collaborators reporting on both methods, the results of the overall method average were 4.3 ppm for polarography and 4.4 ppm for atomic absorption. Since there were no significant differences (p greater than 0.05) found between the method averages, except at one of the unspiked levels, the 2 methods can be used to confirm each other at levels of 1-11 ppm. The polarographic method has been adopted as official first action for the determination of lead in fish. (See also W73-00394) (Long-Battelle)
W73-00395

MICROBIOLOGICAL ASSAY OF STREPTOMYCIN IN FEEDS: 1971 COLLABORATIVE STUDY,
Merck and Co., Inc., Rahway, N.J. Chemical Div.
J. J. Mayernik, G. Y. Fiori, and S. Hughes.
Journal of the Association of Official Analytical Chemists, Vol 55, No 4, p 714-717, 1972. 1 fig, 2 tab, 7 ref.

Descriptors: *Feeds, *Chemical analysis, Data analysis, *Bioassay, Organic compounds, Antibiotics (Pesticides), Laboratory tests, Methodology, Quality control.
Identifiers: *Streptomycin, Collaborative studies, Interlaboratory tests, Data interpretation, Method validation.

Fifteen laboratories participated in a collaborative study to evaluate a modified method for analysis of low levels of streptomycin in feed (5-30 g streptomycin per ton). The modification consisted of (1) increasing the sample size, (2) reducing the amount of agar in the assay plates, (3) lowering the concentration of the reference point on the assay plates, and (4) incubating the plates at 22-25 degrees C instead of 37 degrees C. The results yielded recoveries ranging from 91.7 to 111.0 percent and coefficients of variation ranging from 5.8 to 8.7 percent. The modified method was adopted as official first action based on statistical analysis of the results. (Snyder-Battelle)

W73-00396

TOTAL NITROGEN IN FERTILIZERS,
Missouri Agricultural Experiment Station, Columbia.
For primary bibliographic entry see Field 05B.
W73-00397

CONTRIBUTION TO THE DETERMINATION OF TRACES OF MERCURY BY WICKBOLD COMBUSTION AND FLAMELESS ATOMIC ABSORPTION, (BEITRAG ZUR SUPURENANALYSE VON QUECKSILBER DURCH WICKBOLD-VERBRENNUNG UND FLAMMENLOSE ATOMABSORPTION),
Chemische Werke Huels A.G., Marl (West Germany). Research Dept.
E. Kunkel.
Zeitschrift fur Analytische Chemie, Vol 258, No 5, p 337-341, May 16, 1972. 2 fig, 6 tab, 11 ref.

Descriptors: *Mercury, Halogens, Aqueous solutions, Heavy metals, Chemical analysis, Absorption, Organic compounds, Water analysis.
Identifiers: *Atomic absorption spectrophotometry, Flameless atomic absorption, Chemical interference, Detection limits, Sample preparation, *Wickbold combustion method.

The Wickbold oxyhydrogen combustion method is suitable for sample preparation in trace analysis of mercury by flameless atomic absorption spectrometry. Samples free from halogens may be analyzed by direct atomic absorption measurement of mercury in a combustion-absorption cell. The most reliable method involves combustion in the presence of chlorine, absorption of mercury in sulfuric acid/potassium permanganate solution, followed by reduction, evaporation of mercury vapor by an air/N2-current and flameless atomic absorption spectrometry at 253.7 nm. The method is very versatile and allows mercury analysis in a wide concentration range (.00000001 to approximately 10 percent Hg). (Snyder-Battelle)
W73-00398

MICRODETERMINATION OF MERCURY IN BIOLOGICAL SAMPLES. PART III. AUTOMATED DETERMINATION OF MERCURY IN URINE, FISH AND BLOOD SAMPLES,
Arbetsmedicinska Institutet, Stockholm (Sweden). Dept. of Chemistry.
I. Skare.
Analyst, Vol 97, No 1151, p 148-155, February 1972. 4 fig, 1 tab, 9 ref.

Descriptors: *Mercury, *Fish, *Urine, *Automation, Methodology, Digestion, Chemical analysis, Separation techniques, Biochemistry, Gas chromatography, Neutron activation analysis, Bioassay, Water analysis, Heavy metals, Trace elements, Laboratory tests, Marine fish, Freshwater fish, Reliability, *Pollutant identification.
Identifiers: *Blood, *Mercury analyzer, Sulphamic acid, Homogenization, Methyl mercury, Biological samples, Sample preparation, Wet digestion, Sensitivity, Detection limits, Preconcentration.

Use of the automatic mercury analyzer has been extended to mercury analyses of urine, fish, and blood samples. Sulphamic acid and Triton X-100 detergent are added to urine samples prior to analysis in order to prevent bacterial action. Wet-digestion of blood and fish samples must be performed prior to mercury analysis. With the standard procedures recommended it is possible to determine mercury concentrations in blood down to about the normal values for unexposed persons, i.e., about 5 ng/g, and mercury in fish down to the 0.1 microgram/gram level, with an acceptable standard error. Comparative studies between this method and the methods of activation analysis and gas chromatography have shown good agreement. This method is applicable to all types of samples that can be digested similarly to those above. Natural water samples, normally too low in mercury to be analyzed directly (i.e., less than 0.1 ng/ml), could easily be concentrated by tin (II) reduction of a larger permanganate-digested sample, followed by the passing of the mercury vapor into a 2-ml volume of dilute acidic permanganate solution. The detection limit by this technique would depend only on the level of mercury in the reagent blank. (Snyder-Battelle)
W73-00400

PEPSIN DIGESTIBILITY METHOD FOR ANIMAL PROTEINS. 1971 COLLABORATIVE STUDY,
Moorman Mfg. Co., Quincy, Ill.
A. J. Gehrt.
Journal of the Association of Official Analytical Chemists, Vol 55, No 4, p 702-706, 1972. 1 tab, 4 ref.

Descriptors: *Digestion, *Filtration, *Analytical techniques, *Protein, Centrifugation, Poultry, Nitrogen compounds, Organic compounds, Chemical analysis, Methodology, Quality control.
Identifiers: *Pepsin, *Interlaboratory tests, Collaborative studies, Biological samples, Method validation, Data interpretation.

Twenty collaborating laboratories evaluated a new method of filtering residues from a pepsin digestibility test of animal proteins. When the first action method was modified by more detailed filtering instructions, the analysts found increased sensitivity and reproducibility. Based on the data from the collaborative studies the method has now been adopted as official first action for poultry by-product meal and hydrolyzed feathers and as final action for other animal proteins. (Mortland-Battelle)
W73-00401

COLLABORATIVE STUDY OF METHODS FOR FREE AND TOTAL WATER IN FERTILIZER,
Tennessee Valley Authority, Muscle Shoals, Ala. Div. of Chemical Development.
R. D. Duncan.
Journal of the Association of Official Analytical Chemists, Vol 55, No 4, p 699-701, 1972. 2 tab, 5 ref.

Descriptors: *Fertilizers, *Separation techniques, Evaluation, *Chemical analysis, *Distillation, Standards, Methodology, Laboratory tests, Quality control.
Identifiers: *Collaborative studies, *Interlaboratory tests, Sensitivity, Chemical interference, Data interpretation, Method validation.

Six laboratories participated in the analysis of five samples in a collaborative study of the 1,4-dioxane extraction method for free water and the distillation method for total water in fertilizer. The results of the extraction method were evaluated by the techniques of matched pairs. The extraction method compared favorably with the official vacuum desiccation method and was adapted as official first action. It was discovered that nitrate in the fertilizer interfered with the proposed method for analysis of total water, and the study was terminated. (Snyder-Battelle)
W73-00402

COLLABORATIVE STUDY OF THE DETERMINATION OF AVAILABLE MANGANESE IN FERTILIZER,
Michigan Dept. of Agriculture, Lansing.
V. A. Thorpe.
Journal of the Association of Official Analytical Chemists, Vol 55, No 4, p 695-698, 1972. 2 tab.

Descriptors: *Chemical analysis, *Fertilizers, *Manganese, Spectrophotometry, Solubility, Acids, Quality control.
Identifiers: *Collaborative studies, *Interlaboratory tests, Method validation, Data interpretation.

A collaborative study was conducted to determine the best method for the analysis of divalent or tetravalent manganese in the presence of the other in a fertilizer mixture. A method for determining water soluble forms of manganese was also included. Twelve industrial and government laboratories participated. Each laboratory tested four samples, each of which contained a single source or mixture of sources of manganese in concentrations ranging from 1 to 3 percent. Sample and standard solutions were prepared according to AOAC standards. Measurement was by atomic absorption spectrophotometry, again according to AOAC standards. The results showed that total manganese is determined by HCl digestion, total divalent manganese by H2SO4-HNO3 digestion, and water-soluble divalent manganese by a water-extraction method. (Mortland-Battelle)
W73-00403

AMINO ACID ANALYSIS OF SOYBEAN MEAL. INTERLABORATORY STUDY,
Agricultural Research Service, Peoria, Ill. Northern Marketing and Nutrition Research Div.
J. F. Cavins, W. F. Kwolek, G. E. Inglett, and J. C. Cowan.
Journal of the Association of Official Analytical Chemists, Vol 55, No 4, p 686-691, 1972. 7 tab, 12 ref.

Descriptors: *Chemical analysis, Hydrolysis, Ammonia, Nitrogen, Statistical methods, Organic compounds, Organic acids, Nitrogen compounds, Quality control, *Soybeans.
Identifiers: *Collaborative studies, *Interlaboratory tests, Method validation, Data interpretation, *Amino acid analysis.

An interlaboratory study was conducted to evaluate the amino acid analysis of soybean meal by hydrochloric acid hydrolysis followed by ion exchange chromatography. A preliminary survey of six laboratories had indicated that the greatest variation in results arose in the hydrolysis procedure where side reactions, destruction, and incomplete release of amino acids can alter the composition of the sample for chromatographic analysis. Five laboratories participated in the study, each using its existing analytical equipment to evaluate four methods of hydrolysis. The results were statistically evaluated by a single laboratory. After this initial study, a second study was conducted to evaluate the effect of soybean meal mesh size on results. Betweenand within-laboratory variations were significant for most amino acids, whereas variations due to hydrolysis procedure and sample mesh size in the under 30 to under 270 mesh range were significant at the 0.05 level for only 2 amino acids. The relative standard deviation was different for each amino acid with cystine, methionine, and ammonia having the highest values. Normalization of results to 95 percent nitrogen recovery had only a small effect on statistical analysis of the data. Values from special analytical procedures for cystine did not agree, whereas those for tryptophan agreed very well. (Mortland-Battelle)
W73-00404

COLLABORATIVE STUDY OF THE DETERMINATION OF IRON AND ALUMINUM IN BAKING POWDER BY ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Food and Drug Administration, Brooklyn, N.Y.
W. Holak.
Journal of the Association of Official Analytical Chemists, Vol 55, No 4, p 684-685, 1972. 3 tab, 2 ref.

Descriptors: Evaluation, Methodology, Quality control, *Iron, *Aluminum.
Identifiers: *Baking powder, *Interlaboratory tests, *Collaborative studies, *Atomic absorption spectrophotometry, Sensitivity, Chemical recovery, Method validation, Interlaboratory tests, Data interpretation.

Commercial baking powder and samples containing added iron and aluminum were analyzed by atomic absorption at several laboratories and the results statistically analyzed. The analyses for aluminum proved to be satisfactory. The results from iron analyses, however, were erratic showing that portion of the analytical technique to be unacceptable. (Snyder-Battelle)
W73-00405

COLLABORATIVE STUDY OF MICROANALYTICAL DETERMINATION OF BROMINE AND CHLORINE BY OXYGEN FLASK COMBUSTION,
Rutgers-The State Univ., Newark, N.J. Coll. of Arts and Sciences.
A. Steyermark, R. A. Lalancette, and E. M. Contreras.
Journal of the Association of Official Analytical Chemists, Vol 55, No 4, p 680-683, 1972. 1 tab, 24 ref.

Descriptors: Organic compounds, *Chemical analysis, Laboratory tests, Methodology, Evaluation, Sensitivity, Quality control, *Bromine, *Chlorine.
Identifiers: *Interlaboratory tests, Collaborative studies, Method validation, Data interpretation, *Oxygen flask combustion.

Twenty-six collaborators participated in a collaborative, microanalytical determination of bromine and chlorine by oxygen flask combustion, followed by mercurimetric titration of the ionic halide. After eliminating the results of four laboratories for Br analysis as poor, the mean value obtained was 37.33 percent; the theoretical mean, 0.00 percent; standard deviation, 0.18; and the standard deviation of the mean, 0.15. The values obtained for chlorine, after elimination of poor results were: 20.89 percent, minus 0.01 percent, 0.14, and 0.12, respectively. The method was adopted as official first action as an alternative to the Carius method for the determination of bromine and chlorine in organic compounds. (Snyder-Battelle)
W73-00406

MICROCHEMICAL METHODS. COLLABORATIVE STUDY OF THE AUTOMATIC CARBON, HYDROGEN, AND NITROGEN DETERMINATION,
Agricultural Research Service, Philadelphia, Pa. Eastern Marketing and Nutrition Research Div.
L. H. Scroggins.
Journal of the Association of Official Analytical Chemists, Vol 55, No 4, p 676-679, 1972. 4 tab.

Descriptors: *Carbon, *Hydrogen, *Nitrogen, Evaluations, *Chemical analysis, Data analysis, Sensitivity, *Automation, Instrumentation, Methodology, Quality control.
Identifiers: Acetanilide, Nicotinic acid, Stearic acid, Methyl palmitate, Ethyl laurate, Interlaboratory tests, Quality control, Collaborative studies, Method validation, Data interpretation.

A method for the simultaneous determination of per cent carbon, hydrogen, and nitrogen, employing automatic instrumentation, was tested by 10 collaborators. The samples analyzed were acetanilide, nicotinic acid, stearic acid, methyl palmitate, and ethyl laurate. Evaluation of the statistical data and overall consideration indicate satisfactory results for all types of compounds studied. The method was adopted as official first action. (Snyder-Battelle)
W73-00408

PRELIMINARY REPORT: A SYSTEM FOR TYPING SALMONELLA THOMPSON,
Maine Univ., Orono. Dept. of Microbiology; and Maine Univ., Orono. Dept. of Animal and Veterinary Sciences.
M. Gershman.
Applied Microbiology, Vol 23, No 4, p 831-832, April 1972. 2 tab, 9 ref.

Descriptors: *Bacteriophage, *Pollutant identification, Salmonella, Water pollution sources, Sewage, Methodology, Separation techniques, Sewage bacteria.
Identifiers: *Salmonella thompson, *Phage typing, Plaques, Enumeration, Culture media, Sample preparation.

A routine phage dilution test is presented for the phage typing of Salmonella thompson. S. thompson specific bacteriophages were isolated by the membrane filtration of sewage solutions and plating the filtrate onto cultures of S. thompson. Cultures of S. thompson to be typed were incubated 1.5 hr until turbid and flooded onto a nutrient agar plate. Phage dilutions of not less than 1 to 1000 were spotted onto the plate in order to improve accuracy. Phage activity was recorded as confluent lysis, opaque lysis, semiconfluent lysis, and numbers of plaques. Eight phages were isolated and used for identification of 13 distinct phage types. (Long-Battelle)
W73-00409

RAPID ORNITHINE DECARBOXYLASE TEST FOR THE IDENTIFICATION OF ENTEROBACTERIACEAE,
California Univ., Davis. School of Medicine.
G. D. Fay, and A. L. Barry.
Applied Microbiology, Vol 23, No 4, p 710-713, April 1972. 2 fig, 1 tab, 18 ref.

Descriptors: *Pollutant identification, Hydrogen ion concentration, Color reactions, Amino acids, Aqueous solutions, E. coli, Water pollution sources, Aerobic bacteria, Bacteria.
Identifiers: *Ornithine decarboxylase test, *Enterobacteriaceae, Serratia, Glucose, Enterobacter cloacae, Klebsiella pneumoniae, Proteus morganii, Proteus vulgaris, Proteus rettgeri, Escherichia.

A rapid ornithine decarboxylase test has been developed for the identification of the Enterobacteriaceae, separation of members of the Klebsiella-Enterobacter-Serratia group, and identification of species of Proteus. Conventional methods for detecting ornithine decarboxylase activity require an extended period of incubation. However, with a few simple modifications, accurate results were obtained within a few hours rather than several days. The broth medium was modified, primarily by omitting glucose and by decreasing the pH to 5.5. A 1-ml amount of this broth was inoculated with one colony and then overlaid with sterile mineral oil. Within 2 to 4 hr, the pH increased if ornithine was decarboxylated, thus changing the color of the internal pH indicator to a dark sample. If the amino acid was not decarboxylated, the pH decreased to pH 5.0 to 5.2, enough to give a definite yellow color. With 347 selected clinical isolates, the rapid test gave results identical to those obtained in 1 to 4 days with Moeller's decarboxylase medium. Less reliable results were obtained with Difco's decarboxylase medium with 0.3 percent agar which was stab-inoculated and read after 18 to 24 hr without a mineral oil seal. The rapid ornithine decarboxylase test represents a simple, accurate technique which is well suited for the clinical microbiology laboratory. (Byrd-Battelle)
W73-00410

OXYGEN SUPERSATURATIONS IN THE CHUKCHI AND EAST SIBERIAN SEAS,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 05C.
W73-00411

LIQUID SAMPLING SYSTEM DOES NOT CONTAMINATE SAMPLE.

Instrument Practice, Vol 26, No 3, p 138, March 1972. 1 fig.

Descriptors: *Instrumentation, *Equipment, *Water analysis, Water quality, *Water sampling, *Monitoring efficiencies, Electrodes, Water level reorders, Control systems, Data collections, Electronic equipment, On-site tests, Research equipment, Pumps, Flow control, Valves, Water quality control, Pollutant identification, Design, Current meters, Stream gages, Discharge lines.

A suitable liquid sampling system was designed for use in a water treatment purification plant and for source water quality surveillance systems. The sampling system precisely measures samples from 100 to 500 ml without the possibility of contamination. The liquid samples are sucked into the measuring chamber and then automatically released by level setting electrodes into a sample reservoir for analysis. To ensure free flow of the sample into and out of the measuring chamber, the inlet pipe is 19mm dia., and the outlet is 30mm dia. The pumping height is more than 6m. The supply voltage is 220V at 50Hz with a consumption of approximately 100W. In operation, an initiating pulse derived from a flowmeter is required by the control unit. Alternatively an integral timing device can be fitted to enable samples to be taken at regular preset intervals. The equipment is mounted in a pressure molded plastic case and has a transparent cover which enables the operation to be observed. A diagram and an operation scheme of the system are presented. (Long-Battelle)
W73-00413

NEW TECHNIQUE FOR BIOTYPING,
Rijksinstituut voor de Volksgezondheid, Bilthoven (Netherlands).
P. A. M. Guinee, W. J. Van Leeuwen, and W. H. Jansen.
Applied Microbiology, Vol 23, No 6, p 1172-1174, June 1972. 2 fig, 3 tab, 3 ref.

Descriptors: *Cultures, *Salmonella, *Pollutant identification, Biochemistry, Methodology, Aerobic bacteria.
Identifiers: *Biotyping, Agars, Multiple reagent dispenser, Salmonella typhimurium, Sample preparation, Culture media.

A technique developed primarily for the biotyping of Salmonella typhimurium uses disposable trays instead of glass tubes and agar instead of liquid medium. A multiple reagent dispenser is used to dispense 0.5 ml samples of the media into the 96 cups on the plastic tray. The filled trays are covered with adhesive tape and stored at 4C. After 16-20 hr of incubation at 37C, 0.05 ml of saturated lead acetate solution is injected through the tape by means of a flame sterilized injection needle; reactions are then read. Sixteen strains can be biotyped in one tray, and results are the same as with conventional biotyping tubes. Advantages of the technique include smaller media requirements, less time for dispensing media, less laboratory space, and quicker inoculation and reading. The method is probably applicable for other biochemical tests but where prolonged incubation is required, another inoculation technique that does not puncture the adhesive tape would be necessary. (Mortland-Battelle)
W73-00414

SCANNING ELECTRON MICROSCOPY OF MICROBIAL CELLS ON MEMBRANE FILTERS,
Georgia Univ., Athens. Inst. of Ecology.
R. L. Todd, and T. J. Kerr.
Applied Microbiology, Vol 23, No 6, p 1160-1162, June 1972. 6 fig, 4 ref.

Descriptors: *Bacteria, *Pollutant identification, Methodology, *Biomass, Electron microscopy, Microbiology, Instrumentation, Filtration, Aerobic bacteria.
Identifiers: *Membrane filters, *Scanning electron microscopy, Staphylococcus aureus, Bacillus subtilis, Millipore filters, Nuclepore filters, Glutaral-

dehyde, Cacodylate, Sample preparation, Sample preservation.

Establishing a feasible electron microscopic method for the in situ observation and calibration of microbial biomass required the examination of pure cultures of bacteria as reference organisms. Pseudomonas, Staphylococcus aureus, and Bacillus subtilis were collected on two different membrane filters (Millipore and Nuclepore). For microscopic analysis, samples of the bacteria, vacuum-filtered on respective filters, were fixed with glutaraldehyde cacodylate, washed with cacodylate buffer, and coated uniformly with gold (100 nm) on a rotary turntable at a milli torr. Nuclepore membrane filters were preferred due to a lesser variation in pore size, which affords a coarse internal size calibration, and the greater degree of contrast provided. Scanning electron micrographs for the bacteria on the two filters are provided. (Long-Battelle)
W73-00415

RECOGNITION OF GROUP D STREPTOCOCCAL SPECIES OF HUMAN ORIGIN BY BIOCHEMICAL AND PHYSIOLOGICAL TESTS,
Center for Disease Control, Atlanta, Ga.
R. R. Facklam.
Applied Microbiology, Vol 23, No 6, p 1131-1139, June 1972. 4 tab, 25 ref.

Descriptors: *Streptococcus, *Systematics, *Cultures, *Isolation, Microorganisms, Bacteria, Aerobic bacteria, Bioindicators, Biochemistry, Classification, Pathogenic bacteria, Methodology.
Identifiers: Streptococcus faecalis var. zymogenes, Streptococcus faecalis var. liquefaciens, Streptococcus faecium, Streptococcus durans, Streptococcus bovis, Streptococcus equinus, Streptococcus avium, Culture media.

The purpose was to show that speciation of group D streptococci isolated from clinical material can be accomplished if a spectrum of characteristics are considered as recommended by Deibel. Speciation of 262 strains of group D streptococci isolated from blood cultures and from clinical cases of subacute bacterial endocarditis was carried out by standard techniques. The results show that 98 Streptococcus faecalis, 29 S. faecalis var. zymogenes, 44 S. faecalis var. liquefaciens, 27 S. faecium, 13 S. durans, 44 S. bovis, and 7 unspeciated S. bovis-like group D isolates were identified. No. S. faecium var. casseliflavus, S. equinus, or S. avium (group Q streptococci) were identified among the human isolates. Ninety-eight percent of the 262 strains were speciated by a spectrum of tests that allowed recognition of atypical as well as typical strains within species. (Snyder-Battelle)
W73-00416

EFFECTS OF PROLINE ANALOGUES ON THE FORMATION OF ALKALINE PHOSPHATASE IN ESCHERICHIA COLI,
Washington Univ., St. Louis, Mo. Dept. of Microbiology.
For primary bibliographic entry see Field 05C.
W73-00420

ISOLATION AND TAXONOMIC SIGNIFICANCE OF BACTERIOPHAGES FOR NON-PROTEOLYTIC CLOSTRIDIUM BOTULINUM,
Wisconsin Univ., Madison. Dept. of Bacteriology.
H. Sugiyama, and G. J. King.
Journal of General Microbiology, Vol 70, p 517-525, 1972. 2 fig, 1 tab, 23 ref.

Descriptors: *Bacteriophage, *Pollutant identification, *Isolation, *Systematics, *Bioindicators, Bottom sediments, Bottom sampling, Toxins, Electron microscopy, Antibiotics (Pesticides), Methodology, Clostridium, Anaerobic bacteria, Water pollution sources, Cultures, DDT, Chlorinated hydrocarbon pesticides, Rivers, Freshwater fish.
Identifiers: *Clostridium botulinum, Culture media, Catostomus, Moxostoma, Mitomycin C, Clostridium botulinum Type E, Phages.

Bacteriophages, lytic for wild-type Clostridium botulinum and different from the phages induced from lysogenic cultures, were isolated and characterized. The phages were isolated from bottom sediments of an inland bay and its tributary by filtering cultures of various toxigenic and nontoxigenic C. botulinum which had been incubated with 3 gm of the sediment. Phage stocks were prepared by plating dilutions of the active filtrate with the lost strain used in the phage dilution. These phage stocks and lysogenizing phages, obtained by mitomycin C induction of TPGY cultures, were stained with phosphotungstic acid and examined with an electron microscope. The host ranges indicated seven phages in three morphological groups: three were tailless phages, three had hexagonal head and sheathless flexible tail, and one had a sheathed tail. The hosts were restricted to non-proteolytic C. botulinum strains producing type B, E, or F toxin and to a few of the non-toxigenic clostridia which resemble C. botulinum type E. None of the phages was active on proteolytic C. botulinum producing type A, B, or F toxin or cultures producing type C or D toxin. The host ranges of these phages may prove useful for classification of the C. botulinum types. (Long-Battelle)
W73-00421

PHYSIOLOGY OF A NEW FACULTATIVELY AUTOTROPHIC THERMOPHILIC THIOBACILLUS,
Texas Univ., Austin. Dept. of Microbiology.
For primary bibliographic entry see Field 05B.
W73-00422

SOIL ENRICHMENT FOR THE ISOLATION OF SPORANGIAL SUBGROUP II BACILLUS SPECIES, AND OBSERVATIONS CONCERNING A COIL-FORMING MEMBER OF THIS GROUP,
Pennsylvania State Univ., University Park. Dept. of Microbiology.
R. T. Wood, and L. E. Casida, Jr.
Canadian Journal of Microbiology, Vol 18, No 7, p 1031-1038, July 1972. 5 fig, 4 tab, 17 ref.

Descriptors: Aqueous solutions, *Fertilization, Spores, *Cultures, Hydrogen ion concentration, Water pollution, Pollutant identification, Isolation, *Soil analysis.
Identifiers: *Bacillus, *Enrichment, Culture media.

Enrichment culture procedures are described which allow recovery from soil of mainly sporangial subgroup II Bacillus species, subgroup I plus subgroup II, or the latter plus a coil-forming member of subgroup II. After isolation, the coil-forming type grew normally and sporulated extensively only on agarized soil medium. Growth was normal on soil extract agar but sporulation was less extensive. Limited sporulation occurred when divalent cations were added to more conventional media. Normal vegetative growth occurred on other media investigated only when the pH value was held within relatively narrow limits. The presence of carbohydrate in agar media caused partial growth inhibition, a lack of catalase activity, and the formation of very long coiled cells plus pleomorphic cells, whereas overt cell lysis occurred in vigorously shaken broth cultures. These responses possibly reflect an unbalanced growth condition caused by growth at pH extremes and not by carbohydrate per se. The characteristic features that set the coil-forming bacilli apart from other subgroup II Bacillus species were shown to be (1) their inability to grow at pH values below 6.5, (2) their inability to ferment carbohydrates, (3) their high oxygen requirement for growth, and (4) their ability to reduce thiosulfate to H2S. In addition, these bacilli can be distinguished from closely related established species by other biochemical tests. (Byrd-Battelle)
W73-00424

PHOTOREACTIVATION IN HALOBACTERIUM CUTIRUBRUM,
California State Univ., Long Beach. Dept. of Microbiology.
M. A. Hescox, and D. M. Carlberg.
Canadian Journal of Microbiology, Vol 18, No 7, p 981-985, July 1972. 3 fig, 1 tab, 23 ref.

Descriptors: *Ultraviolet radiation, Halophytes, Microorganisms, Photoactivation, Pigments, Aerobic bacteria, Pollutant identification, Cultures, Equipment, Solvents.
Identifiers: *Halophilic bacteria, *Photoreactivation, *Diphenylamine, *Halobacterium cutirubrum, Carotenoids, Alpha-bacteriopurpurin, Deoxyribonucleic acid, Ethanol, Survival.

The role of pigment in the photoreactivation of a UV-damaged, halophilic bacterium, Halobacterium cutirubrum, was investigated by exposing cell suspensions to ultraviolet light (15 ergs per square mm) and placing them in an ice bath 3 in below a 15-watt fluorescent lamp for photoreactivation. A population irradiated to 1 percent survivors was able to photoreactivate to complete recovery of the original population in less than 1 h of illumination. However, cells whose carotenoid pigments had been inhibited by exposure to 1 micromolar diphenylamine were not able to photoreactivate as efficiently. These carotene pigments have been implicated in an energy-transfer role to augment the photoreactivation mechanism. (Long-Battelle)
W73-00425

DETECTION OF A FOOD BACTERIUM BY A BACTERIOPHAGOUS NEMATODE,
Auburn Univ., Ala. Dept. of Botany and Microbiology.
M. M. Joshi.
M. Sc. Thesis, March 1972. 80 p, 22 fig, 9 tab, 66 ref, 1 append. OWRR A-016-ALA (1).

Descriptors: *Nematodes, *Food habits, *Bacteria, *Migration, *Pollutant identification, *Bioindicators, Animal behavior, Cultures, Amino acids, Organic compounds, Invertebrates, Attractants, Carbon dioxide, Temperature, Hydrogen ion concentration, Vitamins, Phosphates, Bioassay, Microscopy.
Identifiers: Pelodera chitwoodi, Achromobacter nematophilus, Achromobacter parvulus, Alcaligenes metacaligenes, Arthrobacter globoiformes, Brevibacterium liquefaciens, Chromobacterium janthinum, Kurthia zopfii, Vibrio percolans, Agarbacterium, Cysteine, Methionine, Leucine, Threonine.

Studies were conducted to ascertain whether nematode aggregation around colonies of food bacteria occurs by random movement or by attraction to bacteria. Eight of ten bacterial species tested served as sole sources of food for Pelodera chitwoodi. Vibrio (fooc bacterium) and Chromobacterium (non-food bacterium) were used to further test nematode migration under various culture conditions. Nematodes preferentially migrated to Vibrio species from varying distances at various temperatures and pH values. The migration was proportional to bacterial concentration. Resting or dead bacteria failed to attract nematodes. The nematodes migrated past barriers, against gravity, and into reduced oxygen tension to reach the food bacteria. Four amino acids and two vitamins, products from the bacteria, attracted the nematodes, but not as strongly as the bacteria. The bacteria specimens were prepared by inoculation into nutrient broth, then incubated, and harvested by centrifugation. The cells were suspended in phosphate buffer and density adjusted. Nematode

counts were made with a dissecting microscope. (Pestel-Battelle)
W73-00426

ISOLATION AND CHARACTERIZATION OF A PHAGE FOR PSEUDOMONAS AERUGINOSA,
Auburn Univ., Ala. Dept. of Botany and Microbiology.
J. Metcalf.
M. Sc Thesis, June 1972. 101 p, 13 fig, 21 tab, 81 ref. OWRR A-016-ALA (2).

Descriptors: *Bacteriophage, *Physical properties, *Electron microscopy, *Isolation, Bacteria, Microorganisms, Cultures, Temperature, Pigments, Hydrogen ion concentration, Enzymes, Microscopy, Separation techniques, Solvents, Solvent extractions, E. coli, Systematics, Viruses, Cultures.
Identifiers: *Pseudomonas aeruginosa, *Characterization, Culture media, Salmonella typhimurium, Serratia marcescens, Antiserum.

Research involved the isolation and characterization of a phage infectious to Pseudomonas aeruginosa. Phages were isolated for study by aseptically removing an individual plaque from a Pseudomonas culture infected with bacteriophage. The effects of host cell age, media composition, temperature, and pH were studied in order to determine optimum conditions for phage production. Results indicated that the particular phage isolated was a virulent phage which attacks P. aeruginosa. Optimum phage production occurs when host cells used for inoculation are in their logarithmic growth phase and when the phage and bacterium are incubated at 35C for 24 hr in peptone-based medium at pH 6-7. The phage was inactivated by heating at 60C for 30 min or by extremes in pH, 4 or 10. Electronmicrographs revealed a small tadpole-shaped phage with a 25 millimicron diameter head and a 2.4 by 7.4 millimicron tail. Inactivation of the phage with RNase indicated it was an RNA virus. (Long-Battelle)
W73-00427

DISTRIBUTION AND TAXONOMY OF LAMINARIA SINCLAIRII AND L. LONGIPES (PHAEOPHYCEAE, LAMINARIALES),
British Columbia Univ., Vancouver. Dept. of Botany.
J. W. Markham.
Phycologia, Vol 11, No 2, p 147-157, June 1972. 6 fig, 3 tab, 79 ref.

Descriptors: *Distribution patterns, *Systematics, *Ecological distribution, *Spatial distribution, Geographical regions, Phaeophyta, Marine algae, Environmental effects, Marine plants, Canada, Washington, Oregon, California, Alaska, Sea water.
Identifiers: *Laminaria sinclairii, *Laminaria longipes, British Columbia, Russia, Laminaria rodriguezii.

Laminaria sinclairii (Harv.) Farl., And., and Eat. occurs from central British Columbia to southern California. L. longipes Bory occurs from the Kurile Islands throughout the Aleutian Islands to southeast Alaska. Detailed distribution records are presented. Both species are distinguished from other species of Laminaria in having multiple stipes from an expanded, rhizome-like holdfast. The two species are very similar in appearance. Most authors have distinguished them on the basis of internal stipe anatomy; L. sinclairii has mucilage ducts in the stipe, whereas L. longipes does not. Ecological studies were carried out on both species in the field and in the laboratory. The results show the species also differ in several other points, including length of stipes, width of blades, winter loss of blades, morphology of gametophytes, and habitat. The evidence confirms that they should be retained as two separate species. (Long-Battelle)
W73-00428

DIRECT ISOTOPIC DETERMINATION BY ATOMIC FLUORESCENCE SPECTROMETRY,
Houston Univ., Tex. Dept. of Chemistry.
C. Veillon, and J. Y. Park.
Analytical Chemistry, Vol 44, No 8, p 1473-1476, July 1972. 1 fig, 3 tab, 20 ref.

Descriptors: *Stable isotopes, Spectrometers, *Mercury, *Zinc, *Copper, Oxides, Pollutant identification, Distillation, Chemical analysis, Hydrogen, Heavy metals, Iodine, Iodides, Temperature.
Identifiers: *Atomic fluorescence spectrometry, *Indium, Flame atomization, Absorbance.

A direct method of isotopic determination by atomic fluorescence spectrometry employs flame atomization cells. A few milligrams of the stable isotopes of Hg, In, Zn, and Cu obtained as oxides were placed in the manifold system and reduced with hydrogen. Except for mercury, which was used as the metal, iodine was then introduced and the system heated to form the metal iodide, which was then distilled into the lamp blank for analysis by atomic fluorescence spectrometry. Due to the Doppler broadening of the isotopic absorption lines in the flame cell, direct determination of isotopes employing this system is limited to elements having relatively large isotopic displacements. Two alternatives are suggested for overcoming this limitation: (1) Employ Zeeman splitting of the hyperfine structure components to increase isotopic separation by placing the atomization cell in a magnetic field; and (2) Utilize a nonflame atomization cell to generate the sample atoms in an inert atmosphere like argon and observe these atoms in a low temperature region of the atmosphere. (Byrd-Battelle)
W73-00429

PROCEDURES ADOPTED FOR THE LABORATORY CULTIVATION OF TRICHODESMIUM ERYTHRAEUM,
Centre for Advanced Study in Marine Biology, Porto Nova (India).
For primary bibliographic entry see Field 05C.
W73-00430

STEPHANODISCUS BINDERANUS (KUTZ.) KRIEGER OR MELOSIRA BINDERANA KUTZ. (BACILLARIOPHYTA, CENTRALES),
Bristol Univ. (England). Dept. of Botany.
For primary bibliographic entry see Field 05C.
W73-00432

BIOCHEMICAL COMPOSITION OF SUSPENDED ORGANIC MATTER FROM THE TROPICAL PACIFIC (IN RUSSIAN),
Akademiya Nauk SSSR, Kaliningrad. Institut Okeanologii.
For primary bibliographic entry see Field 05B.
W73-00434

RAPID VARIATIONS OF SEA SURFACE TEMPERATURE IN THE PERSIAN GULF AS RECORDED BY NIMBUS 2 HRIR,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 07B.
W73-00435

A SPECIAL CABLE FOR TOWED MAGNETOMETERS (IN RUSSIAN),
Akademiya Nauk SSSR, Kaliningrad. Institut Okeanologii.
For primary bibliographic entry see Field 07B.
W73-00436

ELABORATION AND INVESTIGATION OF SELECTIVE MEMBRANE ELECTRODES. COMMUNICATION 2. AN ELECTRODE WITH THE NITRATE FUNCTION,
Khimiko-Tekhnologicheskii Institut, Moscow (USSR).
A. V. Gordievsky, V. S. Shterman, A. Ya. Syrchenkov, N. I. Savvin, and A. F. Zhukov.
Zhurnal Analiticheskoi Khimii, Vol 27, No 4, p 772-775, April 1972. 3 fig, 1 tab, 10 ref.

Descriptors: *Electrodes, *Ions, *Nitrates, Data analysis, Selectivity, Permselective membranes, Membranes, Instrumentation, Chemical properties.
Identifiers: *Liquid membranes, Ion selective electrodes.

A selective indicator electrode with a liquid membrane (solutions of nitron nitrate in organic solvents) has been studied and found feasible for use within the nitrate ions activity of 1.0-0.001 M. (Snyder-Battelle)
W73-00437

STUDY AND USE OF A SELECTIVE ELECTRODE FOR THE POTENTIOMETRIC DETERMINATION OF FLUORINE (IN RUSSIAN),
R. R. Tarasyants, R. N. Potsepkina, V. P. Roze, and E. A. Bondarevskaya.
Zhurnal Analiticheskoi Khimii, Vol 27, No 4, p 808-811, April 1972. 4 fig, 12 ref.

Descriptors: *Fluorine, *Aqueous solutions, Halogens, Hydrogen ion concentration, Chlorine, Bromine, Iodine, Nitrates, Sulfates, Anions, Permselective membranes, Chemical properties, Pollutant identification, Instrumentation, Membranes.
Identifiers: *Ion selective electrodes, Fluoride electrodes, Membrane electrodes, Chemical interference.

A membrane fluoride electrode made of lanthanum trifluride was used for the potentiometric determination of fluoride ions in aqueous solutions. The linear correlation range of the potential with the fluoride ion concentration (not considering a change of the solution's ionic strength) was within 0.001-1.0 M. The effect of the pH of the medium on the fluoride function of the membrane electrode was studied. The chloride, bromide, iodide, iodate, nitrate, sulfate and (dihydrogen borate) anions at a ratio of 100:1 to fluoride ion had little effect on the fluoride function of the membrane electrode. (Snyder-Battelle)
W73-00438

FREEZING-ETCHING OF MICROORGANISMS FOR ELECTRON MICROSCOPY, (IN RUSSIAN),
B. A. Fikhman, and E. I. Zaichkin.
Mikrobiologiya, Vol 41, No 1, p 168-172, January/February 1972. 3 fig, 18 ref.

Descriptors: *Microorganisms, *Electron microscopy, Sampling, Pollutant identification, Methodology.
Identifiers: *Freeze-etching techniques, Ultrastructure, Cryofixation, Sample preparation, Endomyces magnusii.

A simple modification of the freezing-etching technique is suggested for the electron microscopic study of the ultrastructure of microorganisms. The modification makes it possible to accomplish very rapid vital cryofixation of the cells and simultaneous replication of complementary copies of the object. The super-rapid cooling of the object, as was shown with the cells of Endomyces magnusii, blocked the crystallization of intracellular water and eliminated the necessity of preliminary treatment of the cells with 'antifreezing' liquids. (Long-Battelle)
W73-00445

NEUTRON-ACTIVATION DETERMINATION OF ARSENIC AND ANTIMONY IN OCEANIC WATER AFTER THEIR CONCENTRATION WITH FERRIC HYDROXIDE,
Akademiya Nauk URSR, Sevastopol. Marine Hydrophysics Inst.
A. I. Ryabinin, A. S. Romanov, Sh. Khatamov, A. A. Kist, and R. Khamidova.
Zhurnal Analiticheskoi Khimii, Vol 27, No 1, p 94-99, January 1972. 4 fig, 3 tab, 11 ref.

Descriptors: *Neutron activation analysis, *Separation techniques, *Sea water, Radiochemical analysis, Instrumentation, Chemical precipitation, Methodology, Heavy metals, Pollutant identification, Water analysis.
Identifiers: *Arsenic, *Antimony, Ferric hydroxide, Sample preparation, Precision, Errors, Preconcentration, Coprecipitation.

A neutron-activation method is suggested for the simultaneous determination of arsenic and antimony in oceanic water from a single sample without radiochemical separations. The method includes the preliminary concentration of the determined elements by their coprecipitation with ferric hydroxide. The error of the determination of both elements is not greater than 15 percent. (Long-Battelle)
W73-00446

MODIFICATION OF TECHNIQUE FOR DETERMINATION OF ALUMINUM IN WATER BY ATOMIC ABSORPTION SPECTROPHOTOMETRY,
Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering.
D. Y. Hsu, and W. O. Pipes.
Environmental Science and Technology, Vol 6, No 7, p 645-647, July 1972. 3 fig, 2 ref.

Descriptors: *Aluminum, *Water analysis, Aqueous solutions, Heavy metals, Alkaline earth metals, Solubility, Water pollution, *Pollutant identification, Chemical analysis, Solvent extractions, Chelation, Zinc, Beryllium, Cobalt, Copper, Iron, Nickel, Hydrogen ion concentration, Separation techniques.
Identifiers: *Atomic absorption spectrophotometry, Organic solvents, Benzene, Ethyl propionate, Absorbance, Sample preparation, Detection limits.

In an attempt to improve the sensitivity of determination of Al in water by atomic absorption spectrophotometry, benzene was compared to ethyl propionate to determine the better solvent for extractions of Al using specified chelating agents. Using a standard solution of potassium aluminum sulfate and extraction solutions of benzene and ethyl propionate, the laboratory procedure consisted of (1) determining the optimum pH for extraction; (2) determining the sensitivity of the test at two different concentrations of aluminum and different extraction ratios; and (3) preparing the calibration curve. At the maximum practical extraction ratio of Al in ethyl propionate and benzene, respectively, the best sensitivities of the measurements were 0.24 and 0.009 mg/l per one percent absorption. The improvement obtained with benzene was due mainly to the use of larger quantities of the aqueous sample. The main advantages of using benzene as the solvent are its lower solubility, the smaller amount of acetylene required to support the flame, and the lower cost of benzene. Other metals such as Zn, Be, Co, Cu, Fe, and Ni could also be determined using benzene for extraction. (Byrd-Battelle)
W73-00447

WATER QUALITY NETWORK, 1971 SUMMARY OF DATA, VOLUME 1, ALL ILLINOIS BASINS EXCEPT LAKE MICHIGAN BASIN, SANITARY AND SHIP CANAL BASIN, AND DES PLAINES RIVER BASIN.
Environmental Protection Agency, Springfield, Ill.

1972. 657 P, 3 FIG, 1 TAB.

Descriptors: *Water quality, *Water data, *Illinois, *On-site data collections, *Water sampling, Public health, Water chemistry, Chemical analysis, Water quality act, Statistics, Monitoring, Water conservation, Bodies of water.
Identifiers: *Water quality network.

The Illinois Environmental Protection Agency and its predecessor, the Stream Pollution Control Bureau of the Department of Public Health, have carried out a program of regular sampling of the streams and lakes of Illinois since 1958. The purpose of this Water Quality Sampling Program is to determine the nature and extent of water pollution in the state, and to provide the basic water quality data necessary to carry out the Agency's mission of reducing pollution of Illinois waters. Included in this two-volume report are summary statistics for the parameters of water quality measured most frequently by the Agency at the 464 sampling stations which make up the Illinois Water Quality Network. Volume 1 contains data for all sampling points except those located in areas which drain into Lake Michigan, the Chicago Sanitary and Ship Canal, or the Des Plaines River. Thirty one parameters are recorded. Statistical analyses of data for individual stations have been reported for two time periods. For those parameters measured three or more times during the year, a '1971 Year' statistical analysis appears. For all parameters measured during the year, a 'Sta/Pit' analysis is given covering the entire record of data for that station recorded since 1958. In both cases, the statistical analysis lists the following information for each parameter measured: number of samples; maximum value of the parameter; minimum value; computed arithmetic average values; minimum value of the range into which the median value falls; applicable criteria for each parameter; and the change in the average value for the parameter. (See also W73-00459) (Poertner)
W73-00458

WATER QUALITY NETWORK, 1971 SUMMARY OF DATA, VOLUME 2, LAKE MICHIGAN BASIN, SANITARY AND SHIP CANAL BASIN, AND DES PLAINES RIVER BASIN.
Environmental Protection Agency, Springfield, Ill.

1972. 269 P, 3 FIG, 1 TAB.

Descriptors: *Water quality, *Water data, *Illinois, *On-site data collections, *Water sampling, Public health, Water chemistry, Chemical analysis, Water quality act, Statistics, Monitoring, Water conservation, Bodies of water.
Identifiers: *Water quality network.

The Illinois Environmental Protection Agency and its predecessor, the Stream Pollution Control Bureau of the Department of Public Health, have carried out a program of regular sampling of the streams and lakes of Illinois since 1958. The purpose of this Water Quality Sampling Program is to determine the nature and extent of water pollution in the state, and to provide the basic water quality data necessary to carry out the Agency's mission of reducing pollution of Illinois waters. Included in this two-volume report are summary statistics for the parameters of water quality measured most frequently by the Agency at the 464 sampling stations which make up the Illinois Water Quality Network. Volume 2 contains data for Lake Michigan, the Chicago Sanitary and Ship Canal and the Des Plaines River. Thirty one parameters are recorded. Statistical analyses of data for individual stations have been reported for two time periods. For those parameters measured three or more times during the year, a '1971 Year' statistical analysis appears. For all parameters measured during the year, a 'Sta/Pit' analysis is given covering the entire record of data for that station recorded since 1958. In both cases, the statistical analysis lists the following information for each parameter measured: number of samples; maximum value of the parameter; minimum value; computed arithmetic average values; minimum value of the range into which the median value falls; applicable criteria for each parameter; and the change in the average value for the parameter. (See also W73-00458) (Poertner)
W73-00459

RADIOCHEMICAL MONITORING OF WATER AFTER THE CANNIKIN EVENT, AMCHITKA ISLAND, ALASKA, JANUARY 13-APRIL 5, 1972,
Geological Survey, Lakewood, Colo.
For primary bibliographic entry see Field 05B.
W73-00587

CATION EXCHANGE CAPACITY OF SUSPENDED MATERIAL FROM COASTAL SEA WATER OFF CENTRAL CALIFORNIA,
California Univ., Berkeley. Inst. of Marine Resources.
For primary bibliographic entry see Field 02K.
W73-00599

RADIOISOTOPE X-RAY FLUORESCENCE SPECTROMETRY IN AQUATIC BIOLOGY: A REVIEW,
Fisheries Research Board of Canada, Nanaimo (British Columbia). Biological Station.
J. R. Calaprice, H. M. McSheffrey, and L. A. Lapi.
J Fish Res Board Can. Vol 28, No 10, p 1583-1594. 1971. Illus.
Identifiers: Aquatic animals, Invertebrates, Isotopes, Mollusca, Organisms, Review, *Spectrometry, Tagging, *X-ray spectrometry, *Pollutant identification.

X-ray fluorescence spectrometry is described as an efficient means of carrying out non-destructive qualitative and quantitative chemical analyses of inorganic substances. A brief review is presented on the way in which this methodology was developed to recognize marked individuals and its application towards determining the geographic origin of organisms using multivariate analysis of the trace element composition of untagged animals. In addition the results of experiments in which 34 spp. of invertebrates were compared and different parts of the same organisms irradiated, demonstrated that organisms may possess characteristic elemental compositions that are species specific. Multiple discriminant function analysis of the data showed that species may be classified on the basis of their chemical composition with few errors. Winter and summer growth of molluscan shells were distingisuable by the same method of elemental analysis, and a method for determining the age of organisms is given. Stepwise discriminant function analysis of the groups of elemental standards demonstrate that it is possible to isolate the most significant differences found between the groups compared by this methodology. The importance of these findings studied in biogeochemistry, physiology, and pollution are briefly reviewed. X-ray fluorescence spectrometry is considered to be one of a number of related forms of data acquisition systems, each with broad applications.--Copyright 1972, Biological Abstracts, Inc.
W73-00624

THE VARIABILITY OF COPPER, ZINC, AND MANGANESE CONTENT IN THE WATER OF SOME RIVERS, STREAMS, AND CARP PONDS,
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
For primary bibliographic entry see Field 05B.
W73-00625

5B. Sources of Pollution

MICROBIAL CRITERIA OF ENVIRONMENT QUALITIES,
Copenhagen Univ. (Denmark). Inst. of Hygiene.
For primary bibliographic entry see Field 05C.
W73-00002

RELATIONSHIP BETWEEN STREAM WATER TEMPERATURE AND AMBIENT AIR TEMPERATURE,
Laval Univ., Quebec.
D. A. Cluis.
Nordic Hydrology, Vol 3, No 2, p 65-71, 1972. 2 fig, 2 tab, 4 ref.

Descriptors: *Water temperature, *Air temperature, *Correlation analysis, Forecasting, Stochastic processes, Statistical models, Time lag, Streamflow, Canada, Water quality, *Thermal pollution, Pollutant identification.
Identifiers: Autoregressive models.

The water temperature of a natural stream is determined by two kinds of factors: the meteorological and the geophysical ones. The principal meteorological factors are the air temperature, the intensity and duration of solar radiation, the wind velocity at the surface, and the pressure of water vapor in the air. The main geophysical factors are the depth of the river, the discharge, the degree of mixing, the dimension of the free surface, and the temperature of the superficial and underground inflows. Because air temperatures are a major factor controlling the water temperature, a useful separation can be made between the seasonal cyclic variations and the daily stochastic fluctuations of these temperatures to predict water temperatures. The equation has been tested on the Riviere du Nord, at Saint-Jerome, 48 km north of Montreal, P.Q., Canada. The cyclic components of the temperatures are in phase within one day and the maximum appears 45 days after the 11th of June. This kind of model could be useful to demonstrate thermal pollution caused by industry. (Knapp-USGS)
W73-00013

VERTICAL TEMPERATURE STRUCTURE IN CRATER LAKE, OREGON,
Oregon State Univ., Corvallis. Dept. of Oceanography.
For primary bibliographic entry see Field 02H.
W73-00029

BARIUM AND STRONTIUM IN GROUNDWATERS OF MESOZOIC-CENOZOIC SEDIMENTARY DEPOSITS IN THE CRIMEAN STEPPE ZONE (RASPROSTRANENIYE BARIYA I STRONTSIYA V PODZEMNYKH VODAKH MEZOKAYNOZOYSKIKH OTLOZHENIY STEPNOGO KRYMA),
Nauchno-Issledovatelskii Institut Prirodnykh Gazov, Kharkov (USSR).
For primary bibliographic entry see Field 02K.
W73-00038

EFFECTS OF ACIDITY AND ALKALINITY OF GROUNDWATER ON CONCENTRATION AND MIGRATION OF RARE ELEMENTS (VLIYANIYE KISLOTNO-SHCHELOCHNYKH USLOVIY PODZEMNYKH VOD NA KONTSENTRATSIYU I MIGRATSIYU V NIKH REDKIKH ELEMENTOV),
All-Union Scientific Research Inst. of Hydrogeology and Engineering Geology, Moscow (USSR).
For primary bibliographic entry see Field 02K.
W73-00039

DILUTION OF BUOYANT TWO-DIMENSIONAL SURFACE DISCHARGES,
Minnesota Univ., St. Anthony Falls Hydraulic.
H. Stefan.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY1, Proc. Paper 8653, p 71-86, January 1972. 9 fig, 25 ref, notation.

Descriptors: *Diffusion, Hydraulics, *Cooling water, *Buoyancy, Models, Turbulence, Stratified flow, Environmental engineering, Lakes, Outlets, Powerplants, Thermal powerplants, *Thermal pollution, Temperature, Water quality, Reynolds number, Waves (Water), Mixing, Hydraulic models.
Identifiers: *Buoyant discharges, Fluid flow, Richardson number, Thermal diffusivity.

The flow of heated water from an open channel into a reservoir containing colder and essentially stagnant water has been studied in a laboratory flume. The basic mechanisms which produce mixing between heated discharge and cold water at the transition from a shallow to a deep channel have been documented. Experimental data on internal wave formation and on mixing involving various kinds of internal hydraulic jumps are presented on dimensionless form. A typical example showing the distribution of eddy diffusivities in the presence of a temperature gradient illustrates the mixing process outside the immediate outlet area. The information obtained supports the speculation that dilution of thermal plumes in many prototype situations must be produced mainly by horizontal mixing. (Oleszkiewicz-Vanderbilt)
W73-00073

EVALUATING WATER SURFACE HEAT EXCHANGE COEFFICIENTS,
Pacific Gas and Electric Co., Emeryville, Calif.
For primary bibliographic entry see Field 08B.
W73-00074

MATHEMATICAL MODELS FOR WATER QUALITY EVALUATION,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
For primary bibliographic entry see Field 06A.
W73-00095

MATHEMATICAL MODELS FOR WATER MANAGEMENT IN ONTARIO, STATUS OF THE ART, 1971,
For primary bibliographic entry see Field 06A.
W73-00099

REMOTE SENSING OF THE CHESAPEAKE BAY.

Available from Sup Doc, GPO, Washington, DC 20402 - Price $2.25. Proceedings of Conference held at Wallops Station, Virginia, April 5-7, 1971: National Aeronautics and Space Administration Special Publication, NASA SP-294, 1972. 179 p.

Descriptors: *Chesapeake Bay, *Remote sensing, *Conferences, Data collections, Land use, Land management, Estuaries, Water quality, Water pollution effects, Water pollution sources, Ecology, Industrial wastes, Urbanization, Recreation, Planning, Aerial photography, Satellites (Artificial), Mapping, *Pollutant identification, *Path of pollutants.

The objective of this Conference on Remote Sensing of the Chesapeake Bay was to identify the environmental problems of the area and to determine the extent to which remote sensing can contribute to the solution of these problems. Industries are discharging increasing amounts of oil, exotic chemicals, and trace metals such as zinc, copper, cobalt, and mercury, as well as thermal pollution, all of which upset the ecology of the Bay and its estuaries. Also, sewage discharge from an increasing population increases nitrogen and phosphorus and decreases oxygen in the water. This discharge stimulates obnoxious plant life and endangers fish life. Agricultural activity increases rate of sediment runoff and introduces pesticide and animal wastes into the Bay. Oyster production has been decimated by excessive exploitation, and other species have been reduced by tributary dams and pollution. Well-managed grain, tobacco, and truck farms abound; hardwood and conifer trees are abundant; wildlife areas are plentiful. These are threatened by suburban encroachment. Boating, swimming, skiing, beaching, fishing, and hunting are all increasing rapidly. Dams, bridges, piers, and other installations tend to upset hydrology and nutrients of the system. Conversion of wetlands at an increasing rate upsets the hydrology of the system and also can interrupt the estuarine ecology. Development rates and trends and land use should be studied for the purpose of policy-making and planning at the federal, regional, state, and local levels. (See W73-00102 thru W73-00113) (Knapp-USGS)
W73-00101

TECHNICAL KEYNOTE ADDRESS ON REMOTE SENSING,
National Aeronautics and Space Administration, Houston, Tex. Manned Spacecraft Center.
For primary bibliographic entry see Field 07B.
W73-00102

INDUSTRIAL WASTE POLLUTION,
John Hopkins Univ., Baltimore, Md.
L. D. Jensen.
In: Remote Sensing of the Chesapeake Bay; Proc of Conference held at Wallops Station, Virginia, April 5-7, 1971: National Aeronautics and Space Administration Special Publication, NASA SP-294, p 49-58, 1972. 8 ref.

Descriptors: *Path of pollutants, *Chesapeake Bay, *Remote sensing, *Industrial wastes, Estuaries, Water pollution sources, Water pollution effects, Oxygen demand.

The fate of industrial and domestic wastes, both treated and untreated, which reach the waters of the Chesapeake Bay and its drainage are of interest to scientists, engineers, and regulatory agencies who must be aware of the demand upon the Bay waters for assimilating waste materials. Indiscriminate discharges of industrial wastes must be controlled. The ultimate impact and fate of inorganic and organic industrial waste products within the waters of the Chesapeake Bay can be predicted in a general way through remote sensing and biochemical procedures. This type of information coupled with data regarding the biological populations residing in the Bay and the physical mixing and dispersion mechanisms within the Bay should give the regulatory agencies, concerned citizens, and scientists some of the information they will need to make management decisions that will be required in the coming years. (See also W73-00101) (Knapp-USGS)
W73-00103

SOME APPLICATIONS OF REMOTE SENSING IN ATMOSPHERIC MONITORING PROGRAMS,
Newcastle County Dept. of Natural Resources and Environmental Control, Dover, Del.
A. N. Heller, J. C. Bryson, and N. C. Vasuki.
In: Remote Sensing of the Chesapeake Bay; Proc of Conference held at Wallops Station, Virginia, April 5-7, 1971: National Aeronautics and Space Administration Special Publication, NASA SP-294, p 59-71, 1972. 7 fig, 4 tab, 12 ref.

Descriptors: *Remote sensing, *Monitoring, *Air pollution, *Delaware, Path of pollutants, Instrumentation, Pollutant identification, Telemetry, Chesapeake Bay.
Identifiers: New Castle County (Del).

Pollutants introduced into the air are absorbed into the global circulation pattern. Pollution control strategies must recognize such effects. The air quality of New Castle County, Delaware is determined by using a network of four primary stations and ten secondary stations. The primary stations are housed in self-contained trailers. Each of the primary stations has the capability of continuously measuring the following air-quality indicators: wind direction, wind speed, sulfur dioxide, total oxidants, nitrogen oxides, total hydrocarbons, carbon monoxide, ozone, and particulate matter. As a backup for the primary system a series of ten secondary stations are also operated. These stations have the capability of measuring sulfur dioxide and particulate matter on a continuous basis, and sulfation rate and dustfall on an integrated basis. Each remote station is scanned every three minutes from a central station over leased telephone lines. The total cost of this system is approximately $250,000. Since New Castle County is bordered by the vast Philadelphia Metropolitan Region, the emissions from that area have a definite and deleterious effect on local air quality. Power generation, industrial processes, and industrial fuel burning account for almost 98 percent of the total emission into the atmosphere. (See also W73-00101) (Knapp-USGS)
W73-00104

AGRICULTURAL AND URBAN POLLUTION,
Virginia Inst. of Marine Science, Gloucester Point.
M. L. Brehmer.
In: Remote Sensing of the Chesapeake Bay; Proc of Conference held at Wallops Station, Virginia, April 5-7, 1971: National Aeronautics and Space Administration Special Publication, NASA SP-294, p 73-76, 1972.

Descriptors: *Chesapeake Bay, *Water pollution sources, *Urbanization, *Water pollution effects, Remote sensing.

Agricultural and urban wastes exert many stresses upon the estuarine environment. Several of the upper tidal tributaries of the Chesapeake Bay are now loaded to the point where the intended uses are being contravened. Unless the ailments of the extremities are cured, the main body of the Chesapeake Bay will eventually be degraded until it is no longer useful for commerce and recreational activities. Specific discussions include: increased siltation, (sediment loading), increased organic loading, and increased nutrient loading. (See also W73-00101) (Knapp-USGS)
W73-00105

ESTUARINE TURBIDITY, FLUSHING, SALINITY, AND CIRCULATION,
John Hopkins Univ., Baltimore, Md.
D. W. Pritchard.
In: Remote Sensing of the Chesapeake Bay; Proc of Conference held at Wallops Station, Virginia, April 5-7, 1971: National Aeronautics and Space Administration Special Publication, NASA SP-294, p 77-82, 1972.

Descriptors: *Chesapeake Bay, *Estuaries, *Stratification, *Water temperature, Remote sensing, Variability, Salinity, Turbidity, Water circulation, Streamflow.

The Chesapeake Bay is the largest estuary on the Atlantic coast of the United States. Estuaries may be grouped according to their geomorphological character, and the Chesapeake Bay falls into the group called 'coastal plain' or 'drowned river-valley' estuaries. The vertical structure does not exhibit the sharp interface that occurs at such salt-mud estuaries as the Mississippi where the tidal velocities are very small. In the Chesapeake Bay the tidal velocities are large compared to the velocities that would be induced by the river flow alone. Consequently, the Chesapeake Bay has partial vertical mixing. The Chesapeake Bay roughly is 180 miles in length and 40 miles at its widest point. The main river is the Susquehanna, supplying 50 percent of the total fresh water that enters the Bay. Temperatures follow the seasonal pattern of air temperature with some modification by the influence of the ocean. The Bay is warmer in the upper end than in the lower end in summer and colder in the upper end than in the lower end in winter. The total temperature variation is over 6 deg F and the year-to-year average variation can be almost 1-1/2 deg F above or below the long-time average. (See also W73-00101) (Knapp-USGS)
W73-00106

REMOTE SENSING AND EXTRACTABLE BIOLOGICAL RESOURCES,
Maryland Univ., College Park.
For primary bibliographic entry see Field 07B.
W73-00107

AGRICULTURE AND FORESTRY--IDENTIFICATION, VIGOR, AND DISEASE,
Smithsonian Institution, Washington, D.C.
D. W. Jenkins.
In: Remote Sensing of the Chesapeake Bay; Proc of Conference held at Wallops Station, Virginia, April 5-7, 1971: National Aeronautics and Space Administration Special Publication, NASA SP-294, p 91-102, 1972. 4 fig, 1 tab.

Descriptors: *Remote sensing, *Chesapeake Bay, *Pollutant identification, *Land use, Erosion, Estuaries, Water pollution sources, Land management, Ecology.

The Chesapeake Bay watershed is situated in the middle of a rapidly developing region which is becoming very heavily populated. The condition of the vegetation and general land use is most important in maintaining a suitable environmental quality of both the land and the Bay. The agricultural production of the tidewater region of the watershed is of great value to the human population. The economic value is estimated to be about $500 million per year. Agricultural production and forestry is threatened by urban encroachment and pollution. Poor management of agricultural areas is leading to erosion and depletion of fertility. Better ecological knowledge is required to understand the problems so that better land management can be effected. The agricultural and forestry areas in the watershed are described as well as the production of the watershed; major problems of the watershed are outlined; remote sensing is discussed as it relates to identification of plant species and vigor, pollution, disease, and insect infestation; and recent results are presented of remote sensing of the Rhode River watershed. (See also W73-00101) (Knapp-USGS)
W73-00108

RECREATIONAL USE,
Commission of Outdoor Recreation, Richmond, Va.
For primary bibliographic entry see Field 07B.
W73-00109

ENGINEERING WORKS AND THE TIDAL CHESAPEAKE,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 02L.
W73-00110

USE OF REMOTE SENSING IN SHORELINE AND NEAR-SHORE MANAGEMENT,
Maryland Dept. of Chesapeake Bay Affairs, Annapolis.
For primary bibliographic entry see Field 07B.
W73-00111

PROBLEMS OF URBAN DEVELOPMENT AND GROWTH,
Geological Survey, Washington, D.C.
For primary bibliographic entry see Field 07B.
W73-00112

CHESAPEAKE BAY STUDY,
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W73-00113

EARLY DIAGENESIS IN A REDUCING FJORD, SAANICH INLET, BRITISH COLUMBIA--I. CHEMICAL AND ISOTOPIC CHANGES IN MAJOR COMPONENTS OF INTERSTITIAL WATER,
California Univ., Los Angeles. Dept. of Geology.
A. Nissenbaum, B. J. Presley, and I. R. Kaplan.
Geochimica et Cosmochimica Acta, Vol 36, No 9, p 1007-1027, September 1972. 4 fig, 5 tab, 39 ref. AEC C AT (04-3)-34 P.A. 134.

Descriptors: *Diagenesis, *Fjords, *Canada, *Bottom sediments, *Connate water, Stable isotopes, Oxidation-reduction potential, Ammonia, Phosphate, Silica, Calcium, Biodegradation, Sulfides, Hydrogen sulfide, Dissolved oxygen, Reduction (Chemical).
Identifiers: Saanich Inlet (British Columbia).

Water and interstitial water from the reducing fjord of Saanich Inlet, British Columbia were analyzed for their major element composition, ammonia, phosphate and silica contents, and for stable isotope composition of sulfur and carbon species. Ca was the only major element to show a significant change with depth (a 75 percent decrease in some cases). Ammonia and phosphate are highly enriched in the interstitial water, with concentrations reaching 250 ppm and 39 ppm, respectively. Total dissolved CO_2 increases strongly in interstitial water with depth (20 to 30 times that in overlying sea-water) and it becomes enriched in C-13. Both sulfate and dissolved sulfide decrease with depth to a complete disappearance of all sulfur species from the interstitial water. The dissolved sulfide is highly enriched in S-34. All these changes are attributed to strong biological activity in the sediments. (Knapp-USGS)
W73-00127

THE USE OF RESISTIVITY TECHNIQUES TO DELINEATE ACID MINE DRAINAGE IN GROUND WATER,
Pennsylvania State Univ., University Park. Coll. of Earth and Mineral Sciences.
R. H. Merkel.
Ground Water, Vol 10, No 5, p 38-42, September-October 1972. 8 fig, 8 ref.

Descriptors: *Path of pollutants, *Acid mine waters, *Groundwater, *Monitoring, *Electrical studies, Geophysics, Resistivity, Conductivity, Surveys, Pennsylvania, Groundwater movement, Water pollution sources, Hydrogeology.

A resistivity survey was run in an area of good geologic control to determine if resistivity is a viable technique for delineating aquifers contaminated with acid mine drainage. The high conductivity of the acid water makes it an excellent target to define electrically. Polluted aquifers were traced from their surface expression back under clays, shales, and coal toward the point of origin. Based on these results, and on chemical analysis of streams and ground-water samples, techniques are presented for the periodic monitoring of the ground water through surface resistivity techniques to determine both the extent and degree of contamination. (Knapp-USGS)
W73-00132

GOOD COFFEE WATER NEEDS BODY,
Ohio State Univ., Columbus. Dept. of Geology.

W. A. Pettyjohn.
Ground Water, Vol 10, No 5, p 47-49, September-October 1972. 1 fig, 1 tab, 5 ref.

Descriptors: *Water pollution sources, *Water pollution effects, *Path of pollutants, *Groundwater, Reviews, Nitrates, Chlorides, Phenols, Organic matter, Oily water, Hydrogen sulfide, Waste disposal wells, Underground waste disposal.
Identifiers: *Groundwater pollution.

Some recent ground-water contamination problems have been caused by inadequate waste disposal during years long past and forgotten. Effluent from a livery stable abandoned during the late 1930's contaminated a well in North Dakota; wastes from a gas works plant that operated during the period 1815 to 1830 contaminated a well in Norwich, England; and a well, drilled through a 17th century Black Plague burial pit along England's southern coast, produced hydrogen sulfide. Other examples include wastes from an outdoor privy and the effects of using cavernous limestone terrain for waste disposal. (Knapp-USGS)
W73-00133

TRACER TESTS OF EDDY DIFFUSION IN FIELD AND MODEL,
Hydraulics Research Station, Wallingford (England).
M. J. Crickmore.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY10, Paper 9285, p 1737-1752, October 1972. 9 fig, 10 ref, append.

Descriptors: *Diffusion, *Dispersion, *Tidal effects, *Mixing, *Hydraulic models, Hydraulic similitude, Tracers, Turbulence, Turbulent flow, Dye releases, *Path of pollutants, Hydraulics, Jets, Estuaries, Tides, Currents (Water), Thermal pollution.
Identifiers: *Eddy diffusion.

A comparison was made between data collected in hydrauclic models and in the field of the vertical and lateral spreading of a neutrally buoyant marker fluid discharged continuously at the flow surface of a tidal channel. The comparison supports an analysis showing that a vertically exaggerated hydraulic model distorts the behavior of the plume by exaggerating its width and suppressing its vertical development. Diffusion in the field was closer to Fickian than to the 4/3 law, and the diffusion is primarily a function of eddies created locally by tidal currents and bed roughness. (Knapp-USGS)
W73-00136

PHYSICOCHEMICAL FACTORS AFFECTING THE OXIDATION OF PHENOLIC COMPOUNDS BY OZONE,
Michigan Univ., Ann Arbor. Water Resources and Sanitary Engineering.
D. I. Hirota.
Ph. D. Dissertation, 1970, 162 p.

Descriptors: *Phenols, Water pollution sources, *Ozone, *Oxidation, Spectrophotometry, Water treatment.
Identifiers: *Oxidation rates, Bubble hydrodynamics, Wetted wall column.

The manner in which selected physicochemical factors affect the overall rate of oxidation of phenolic compounds by ozone in dilute aqueous solution was investigated. Results from a steady-state, homogeneous reaction system indicate that the anionic paranitrophenol species were oxidized almost completely in periods less than the minimum 30 millisecond contact period experimentally possible. A semi-batch, bubble column reaction system was also used to determine several gas-phase and liquid-phase parameters that affect the rate of oxidation of phenolic compounds. Although these parameters, such as bubble hydrodynamics, total gas flow rate, ozone concentration, hydrogen ion concentration, solute dissociation, and temperature were shown to have some influence on the overall oxidation rate, complete evaluation and postulation of the overall oxidation rate mechanisms could not be accomplished because of the high reaction velocities involved in the oxidation and because of experimental limitations. (Smith-Texas)
W73-00170

STOCHASTIC MODEL OF BOD AND OD IN SEGMENTED ESTUARY,
Virginia Polytechnic Inst. and State Univ., Blacksburg.
W. R. Schofield, and R. G. Krutchkoff.
Journal of the Sanitary Engineering Division, American Society of Civil Engineers, Vol 98, No SA5, Paper 9296, p 745-762, October 1972. 7 fig, 2 tab, 11 ref, append. Contract 14-12-849 EPA.

Descriptors: *Path of pollutants, *Estuaries, Mathematical models, *Statistical models, *Stochastic processes, *Biochemical oxygen demand, *Oxygen demand, Dissolved oxygen, Ohio River, Potomac River, Water pollution, Water quality, Water pollution control.
Identifiers: Stochastic models.

A one-dimensional stochastic model is developed for BOD and OD in streams and estuaries. The standard Dobbins type assumptions of first-order reaction, deposition, and reaeration rates are assumed, although any rate formulation is permitted by the analysis. The model parameters and process conditions are functions of position in the estuary and time in the tidal cycle. The predicted mean concentration is the same as for deterministic models based on the same assumptions. The predicted mean and distribution about the mean are compared with data from the Potomac Estuary and Ohio River with good agreement on the Potomac and excellent agreement with the Ohio data. With the Potomac data some lack of fit was observed due to photosynthesis and other effects occurring in the estuary which were not included in the model. (Knapp-USGS)
W73-00199

VELOCITY PROFILES AND DISPERSION IN ESTUARINE FLOW,
Arizona State Univ., Tempe. Dept. of Civil Engineering.
B. A. Segall, and E. R. Gidlund.
Journal of the Sanitary Engineering Division, American Society of Civil Engineers Vol 98, No SA4, Paper 9109, p 647-654, August 1972. 18 ref, append.

Descriptors: *Dispersion, *Diffusion, *Estuaries, *Path of pollutants, Tidal effects, Tides, Currents (Water), Water circulation, Turbulence, Shear stress, Drag, Density currents.

The dispersion of pollutants in tidal waters is caused by turbulence and the shear effect of oscillatory, density, wind driven and steady flow currents. This investigation examines velocity gradients in an oscillatory system and the effects that these gradients have on the spread of pollutants. Velocity distributions are derived from the equations of motion and a mass balance relationship is used to model the dispersion process. The resulting equations can be used to estimate the spread of pollutants in the uniform density sections of estuaries in which tidal motion is the predominant mechanism of dispersion or combined with equations which represent the influence of density, wind driven, or steady flow currents. (Knapp-USGS)
W73-00200

THE DESIGN OF THE MONITORING SYSTEM FOR THE THERMAL EFFECT STUDY OF THE SURRY NUCLEAR POWER PLANT ON THE JAMES RIVER,
Virginia Inst. of Marine Science, Gloucester Point.
R. J. Bolus, S. N. Chia, and C. S. Fang.
Special Report in Applied Marine Science and Ocean Engineering No 16, October 1971. 71 p, 31 fig, 8 tab, 12 ref. AEC AT- (40-1)-4067.

Descriptors: *Nuclear powerplants, *Monitoring, *Temperature, Heated water, Thermal powerplants, *Thermal pollution, Water pollution, *Path of pollutants, Instrumentation, Meteorological data, Data collections, Data processing, Data storage and retrieval, Air temperature, Aerial photography, *Virginia.
Identifiers: *James River, *Thermal effects, *Surry nuclear powerplant, Monitoring system, Recording, Infrared sensing.

The objective is to determine the region of the James River estuary which will be affected by the thermal discharges of the Surry nuclear power plant located at Hog Island and the temperature distribution within that region. This progress report compiles the results of the first year of the project. Three environmental measurements systems are employed in collecting field data. The first is a multi-sensor system consisting of 9 temperature sensors, a dew point sensor, a salinometer, a fathometer, a current meter, a position marker, a heading sensor and automatic data recording equipment. The system is mounted on a mobile 30-foot boat. The second system is fixed on towers and records meteorological data. The third is an infra-red sensor scanning system located in a plane. Photography is employed in this case. Raw data from the system are included. (Oleszkiewicz-Vanderbilt)
W73-00208

FOG FORMATION IN PARTIAL CONDENSERS,
Monsanto Co., St. Louis, Mo.
D. E. Steinmeyer.
Chemical Engineering Progress, Vol 68, No 7, p 64-68, July 1972. 2 fig, 14 ref.

Descriptors: *Fog, *Cooling, *Condensation, *Nucleation, Temperature, Precipitation, Condensers, Boilers, Heat transfer, Cooling towers, Thermal powerplants, Heat exchangers, Vapor pressure.
Identifiers: *Mist eliminator, *Partial condensers, Heat recovery boilers, Partial pressure, Fog formation.

Fog formation is a potentially serious yield loss and pollution problem for all processes that involve partial condensation. This is probably well known by anyone who has used a rigorous heat-mass transfer computer program to design partial condensers. It is probably a virtual unknown by most operators of partial condensers. Restated, typical partial condenser calculations show that 5 to 25% of the condensed liquid exists as fog; but typically, there is no indication from the field that anything like this occurs. What is known about fog formation is reviewed and the anomaly cited above is discussed. An attempt is made to answer the questions of why the fog is invariably a potentially serious problem; why this potential is so rarely reached; and when the potential is likely to be real. Particular emphasis is placed on the critical role of foreign nuclei. Potential preventive actions are listed. (Oleszkiewicz-Vanderbilt)
W73-00209

USE OF CHESAPEAKE BAY FOR COOLING THERMAL-ELECTRIC POWER PLANTS; PART I: RESEARCH PRIORITIES; PART II: STATUS OF INFORMATION ABOUT CHESAPEAKE BAY AND SHORELINE,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.

H. G. Wolman, C. D. Meyers, C. R. Flynn, and D. P. Sheer.
Report to Atomic Energy Commission, NYO 4260-1, NYO 4260-2, May 1972. 59 p, 24 fig, 12 tab, 130 ref. AEC AT (11-1)-3291.

Descriptors: *Chesapeake Bay, *Cooling, *Thermal powerplants, *Environmental effects, *Research priorities, Heated water, Temperature, Biology, Bioassay, Monitoring, Physicochemical properties, Water pollution, Economics.
Identifiers: Information status, Biocides, Discharge plume, Physical research, Biological research, Socio-economic research.

In biological research, it is recommended that quantitative information on the life cycle and distribution of important organisms in the Chesapeake Bay must be obtained in order to be able to predict the effects of power plants and cooling water on the biota of the Bay. The effects on organisms of discharge plumes of heated water must be evaluated at power plant sites. Cooperative studies should be undertaken to develop means of reducing the entrapment of organisms in intake structures. Special emphasis must be given to the effects of biocides on organisms in the receiving waters. In physical research, four coordinate areas are recommended for continuing study in order to learn more about the physical behavior of the Chesapeake Bay. These are: (a) Development of a satisfactory mathematical model of the Chesapeake Bay, (b) Development of a diffusion model for estuarine systems, (c) Hydraulic models of the behavior of effluent plumes in oscillating stratified fluids, and (d) Field verification of mathematical and hydraulic laboratory models. The status of information about the Chesapeake Bay with regard to land use, wetlands, important biological species, and physical measurements and special studies of the Bay is described. (See also W73-00213) (Oleszkiewicz-Vanderbilt)
W73-00212

USE OF THE CHESAPEAKE BAY FOR COOLING THERMAL-ELECTRIC POWER PLANTS; PART III-RESEARCH AGENCIES AND INSTITUTIONS WORKING ON CHESAPEAKE BAY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Geography and Environmental Engineering.
C. D. Meyers, M. A. Peregoy, and R. A. Borenstein.
Report to Atomic Energy Commission, NYO 4260-3, May 1972. 68 p. AEC AT (11-1)-3291.

Descriptors: *Chesapeake Bay, *Cooling, *Thermal powerplants, *Environmental effects, Water pollution, Thermal pollution, Administrative agencies, Research facilities, Research priorities.
Identifiers: *Research agencies, *Addresses, Administrators, Program summaries.

This is the third part of a three part report. The first two parts contain (I) Research Priorities, and (II) Status of Information about the Chesapeake Bay. Part (III) is a compilation of agencies involved in research on the Chesapeake Bay, listing addresses, person to contact, primary parameters of interest, summary of institutional or project goals, number of professional personnel, floor space, institutional vessels, and titles of programs currently underway or anticipated to be underway within the next 6 months. (See also W73-00212) (Oleszkiewicz-Vanderbilt)
W73-00213

SURFACE JET MODEL FOR HEATED DISCHARGES,
Vanderbilt Unit., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
For primary bibliographic entry see Field 08B.
W73-00215

THERMAL DIFFUSION OF THE WARM WATER OF POWER PLANTS INTO A SEA BASIN,
Imatran Voima Osakeyhtio, Helsinki (Finland). Nuclear Power Project Group.
Y. S. El Mahgary.
The Journal of Environmental Sciences, p 20-23, November/December 1971. 3 fig, 25 ref.

Descriptors: *Heated water, *Mathematical models, *Heat transfer, Diffusion, Mathematics, Sea water, Water pollution, Powerplants, Nuclear powerplants, Thermal pollution, Thermal powerplants, Temperature.
Identifiers: *Thermal diffusion, Thermal load, Sea basin, Longitudinal mixing, Vertical mixing.

The mechanisms of thermal diffusion and heat transfer in a sea basin is a subject of considerable importance. With the construction of more and larger power generating and industrial plants along the shores of seas and large lakes, the need for improving the present understanding of the effects of applying thermal loads to the water bodies is increasing. The equation of thermal diffusion in a sea basin is examined, assuming that the coefficient of thermal diffusion increases according to the scale. The relation between the thermal diffusion coefficient and the scale was assumed to be the same as that between the mass diffusion coefficient and the scale. The term of the change in water enthalpy was separately examined. The common formula used for evaluating the heat of evaporation was modified to take into account the effect of free convection. Also a convenient formula was introduced for the estimation of the net short-wave radiation. (Oleszkiewicz-Vanderbilt)
W73-00217

MODELING OF THERMAL DISCHARGES IN SHALLOW ESTUARIES,
Tracor, Inc., Austin, Tex. Ocean Sciences and Water Resources.
W. H. Espey, Jr., D. R. Betterton, A. J. Mary, and W. M. Mayer.
Proceedings of the American Power Conference, Volume 33, p 457-464, 1971. 5 fig, 7 ref.

Descriptors: *Estuaries, *Mathematical models, *Thermal pollution, *Temperature, Thermal powerplants, Planning, Cooling, Mixing, Outlets, Model studies, Simulation analysis, Velocity distribution, Energy budget, Heat budget, Evaporation, Gulf of Mexico, Powerplants.
Identifiers: *Modeling, *Thermal discharges, Impact area.

The impetus behind this mathematical modeling effort was the development and verification of a predictive tool for the shallow, vertically well-mixed estuaries along the Gulf Coast. Verification consisted of exercising the model under known environmental and plant operating conditions, and comparing the model results with field measurements of the thermal distribution. A summary of the model results in the form of calculated vs. measured plume size is presented. In its present state of development, the model is capable of describing quantitatively the thermal distribution resulting from a heated discharge into a shallow embayment. The temperature model has been used to analyze the thermal impact of the proposed expansion of a 5000-MW plant and a 569-MW plant. (Oleszkiewicz-Vanderbilt)
W73-00222

ALGAE AS INDICATORS OF PESTICIDE,
State Univ., Coll., Buffalo, N.Y. Great Lakes Lab.
For primary bibliographic entry see Field 05C.
W73-00238

THE OCCURRENCE AND TOXICITY OF A RED TIDE CAUSED BY NOCTILUCA SCINTILLANS (MACARTNEY) EHRENB., IN THE COASTAL WATERS OF HONG KONG,
Hong Kong Univ. Dept. of Zoology; and Hong Kong Univ. Radioisotope Unit.
For primary bibliographic entry see Field 05C.
W73-00253

MEASUREMENT AND MANAGEMENT ASPECTS OF WATER TOXICOLOGY: THE MALIBU WATERSHED, A MIXED RESIDENTIAL AND WILDERNESS AREA,
California Univ., Los Angeles. School of Public Health.
E. S. Flowers.
Available from the National Technical Information Service as PB-212 586, $3.00 in paper copy, $0.95 in microfiche. July 1972. 82 p, 3 fig, 17 tab, 29 ref. OWRR A-038-CAL (1). 14-31-0001-3505.

Descriptors: Sewage treatment, Irrigation, Water quality, Vegetation, Recreation, Watershed management, Land Use, Toxicology, *California.
Identifiers: *Malibu watershed (Calif), Residential, Wilderness, Chaparral, Coastal Mountains (Calif), Fire protection.

A preliminary survey of the Malibu Creek Watershed was conducted to determine dry season water quality and to inventory present and future demands on the water resource in a water deficit region with predominantly chaparral vegetation and mixed residential and wilderness areas. Terrain, vegetation, geology, land use, and water quality were evaluated and described, and preliminary toxicology studies were carried out. Studies on wet season water quality are in progress.
W73-00268

ON THE PHOTOLYTIC SEPARATION OF HALOGENS FROM SEA WATER CONCENTRATES,
Consiglio Nazionale delle Ricerche, Rome (Italy). Centro Nucleazione Aerosoli.
G. L. Petriconi, and H. M. Papee.
Water, Air, and Soil Pollution, Vol 1, No 2, p 117-131, April 1972. 9 fig, 51 ref.

Descriptors: *Sea water, *Halogens, *Separation techniques, Hydrogen ion concentration, Light intensity, Water temperature, Nitrates, Aerosols, Water pollution effects, Ultraviolet radiation, Acidity, Organic matter, Oxides, Oxidation, Chlorides, Nitrites, Air pollution, Iodine, Volumetric analysis, Gases, Analytical techniques.
Identifiers: *Ultraviolet photolysis, Pernitrite, Aitken nuclei.

Recent work on the ultraviolet photolysis of nitrate-bearing material and nitrogen oxides is reviewed. Details are also given of a laboratory investigation on the rates of halogen separation from concentrated seawater by the action of ultraviolet radiation. Release rates of nitrogen oxides and halogens from the photolyzed liquid interphase depend directly on the nitrate present and exponentially on seawater concentration, light intensity, and acidity. Temperature is shown to inhibit these rates. Nitrogen oxide and halogen releases are apparently triggered by the formation of transient pernitrite intermediate oxidants. This is believed to be important to an understanding of natural oxidation reactions occurring in the atmosphere, and of hygroscopic Aitken nuclei formation processes from the released gases. A possibility exists of halogenation and/or nitration of organic matter present in nitrate-bearing aerosols, and of progress towards an explanation of differences in the Cl:Na ratio between this aerosol and seawater. (Mortland-Battelle)
W73-00282

BORON IN SWEDISH AND NORWEGIAN FRESH WATERS,
Uppsala Univ. (Sweden). Inst. of Limnology.
Th. Ahl, and E. Jonsson.

Ambio, Vol 1, No 2, p 66-70, April 1972. 4 fig, 6 tab, 10 ref.

Descriptors: Freshwater, *Boron, *Path of pollutants, Methodology, Rivers, Water pollution sources, Ion exchange, *Chemical analysis, Water pollution, Water analysis, Bioassay, Cyanophyta, Resins, Aquatic plants, Aquatic algae, Nitrates, Nitrites, Eutrophication.
Identifiers: Sample preparation, Chemical interference, Interlaboratory studies, Precision, *Sweden, Lake Malaren, Microcystis flos-aquae, Phragmites communis, *Norway, Macrophytes, Fyrisan River, Arbogaan River, Botorpsstrommen River, Atran River, Motala Strom River, Sparganium erectum, Schoenoplectus lacustris, Acorus calamus, Typha angustifolia.

Monthly water samples were collected from Swedish and Norwegian rivers and analyzed by a modified curcumin method. Samples were passed through a sodium-loaded Dowex 50-W-X4 column and then centrifuged 5 min before absorption measurement to avoid interference from precipitates. A linear relationship was obtained between absorption and concentration in the range 0-100 micrograms/l. Tests showed interference still occurring from nitrate and nitrite so samples high in these compounds were no longer tested. The boron content in the rivers ranged from 1 to 1,046 micrograms B/l, with a median value for all rivers tested at 13 micrograms/l. Any regional differences were attributed to differences in geology, land use, and population density. Aquatic plants were subjected to analysis, and the results showed that the enrichment of boron in aquatic plants is very small compared with the enrichment of phosphorus and nitrogen. Sewage water was analyzed and showed a far lower boron content than English sewage water. The data show that boron content in these freshwaters is low, with a mean concentration close to that of the rivers of the world. (Mackan-Battelle)
W73-00286

SUBMARINE SEEPS: ARE THEY A MAJOR SOURCE OF OPEN OCEAN OIL POLLUTION,
Woods Hole Oceanographic Institution, Mass.
M. Blumer.
Science, Vol 176, No 4040, p 1257-1258, June 16, 1972. 4 ref.

Descriptors: *Oil pollution, *Ocean, Oily water, Water pollution sources, Oil reservoirs, Oil fields, Fuels, Oil spills.
Identifiers: *Submarine seeps, Crude oil.

The relative contribution of submarine seeps as a possible major source of open ocean oil pollution was assessed by reviewing pertinent literature. One article estimated that about 630 billion barrels is the maximum amount of offshore oil that is a likely source of submarine seeps. Another estimates an influx of 0.5 percent of the annual oil production (i.e. 11,000,000 tons in 1970) into the oceans from all sources. Since the oil formation potential of source beds is finite (when considering both the oil pollution from human activity and natural seepages), if annual submarine seepage had averaged 5,000,000 tons since the early Tertiary, the average offshore oil field would have lost to the oceans more than 1500 times the total oil existing on site before commercial offshore oil production started. The implication is that seepage is orders of magnitude less, on a worldwide basis, than the oil pollution caused by man. (Byrd-Battelle)
W73-00288

ENVIRONMENTAL APPLICATIONS OF THE WEIBULL DISTRIBUTION FUNCTION: OIL POLLUTION,
California Univ., Santa Barbara. Dept. of Chemical and Nuclear Engineering.
P. G. Mikolaj.
Science, Vol 176, No 4038, p 1019-1021, June 2, 1972. 1 fig, 1 tab, 8 ref.

Descriptors: *Statistical methods, *Oil pollution, *Sampling, Water pollution, Water pollution sources, Mathematical studies, Statistical models, Oil spills, Probability, Water pollution effects, Correlation analysis, Beaches, Equations, Mathematical models.
Identifiers: *Weibull distribution function, Oil seeps, Data interpretation.

The Weibull distribution function, an empirical three-parameter equation, can be used as a correlating model for statistically interpreting ambient pollution concentrations. The most important parameter for environmental research is the threshold parameter, gamma, which is defined as the minimum value that a variable is likely to attain. Data from three examples involving beach contamination from natural oil seeps; threshold values for minor, moderate, and major oil spills; and expected duration of oil spill effects are applied to the function to demonstrate types of additional information that can be obtained. (Pestel-Battelle)
W73-00289

DISTRIBUTION AND ECOLOGY OF CERATIUM EGYPTIACUM HALIM AND ITS VALIDITY AS INDICATOR OF THE CURRENT REGIME IN THE SUEZ CANAL,
Alexandria Univ. (Egypt). Dept. of Oceanography.
N. M. Dowidar.
Internationale Revue der Gesamten Hydrobiologie, Vol 56, No 6, p 957-966, 1971. 3 tab, 23 ref.

Descriptors: *Bioindicators, *Ecological distribution, *Currents (Water), *Dinoflagellates, Ecology, Distribution patterns, Marine animals, Salinity, Sampling, Sea water, Bodies of water, Pyrrophyta, Protozoa, Marine algae, Zooplankton, Phytoplankton.
Identifiers: *Ceratium egyptiacum, *Suez canal, Flagellates, Mediterranean Sea, Red Sea, Drift organisms.

Ceratium egyptiacum, an erythraean dinoflagellate species, was recorded for the first time from the Mediterranean waters in 1966. The species is indigenous and perennial to the Red Sea and the southern part of the Suez Canal. Ecologically the species proved to be a strictly neritic surface water form avoiding the oceanic and deep waters. It is also highly tolerant; its salinity and temperature ranges recorded in this investigation are respectively 3.3-4.7 percent and 14.2 C - 33 C. The occurrence of the species in the Mediterranean waters suggests a recent immigration to that sea through the Suez Canal and provides a good example for studying the current regime in the Canal, particularly after the construction of the Aswan High Dam. The distribution of the species in the Mediterranean is detailed. The current in the canal is northward throughout the whole year and is not reversed in August and September as was previously normal. The importance of the Suez Canal as a biological link between the Mediterranean and the Red Sea, the migration of Red Sea plankton organisms through the canal and the future prospects of the new conditions are discussed. (Long-Battelle)
W73-00296

MICROBIOLOGY OF SCUM FORMED AT THE SURFACE OF LAGOONED WASTEWATER,
Maharaja Sayajirao Univ. of Baroda (India). Dept. of Biochemistry.
S. V. Ganapati, and P. M. Amin.
Journal Water Pollution Control Federation, Vol 44, No 5, p 769-781, May 1972. 3 fig, 12 tab, 28 ref.

Descriptors: *Sewage lagoons, *Microbiology, *Scum, *Waste water (Pollution), Water pollution sources, Sewage bacteria, Biological properties, Aqueous solutions, Yeasts, Microscopy, Biochemistry, Carbohydrates, Proteins, Amino acids, Nitrogen, Lipids, Water quality, Protozoa.
Identifiers: Biochemical tests, Zoogloea ramigera, Vorticella microstoma, Paramecium caudatum, Bacillus, Alcaligenes spp, Corynebacterium, Xanthomonas, Podophrya fixa, Brevibacterium spp, Micrococcus, Comamonas, Sarcina spp, Flavobacterium spp.

The microscopic, bacteriological, and biochemical characteristics of viscous scum formed at the surface of lagooned wastewater were investigated. A sample of raw, settled wastewater was collected and examined microscopically for identification of organisms contained in the surface scum. Zoogloea ramigera colonies were isolated in a nutrient broth medium along with Vorticella microstoma, Paramecium caudatum, Alcaligenes, Xanthomonas, Podophrya fixa and Brevibacterium. The following microorganisms were isolated from the raw wastewater: Micrococcus, Sarcina, Brevibacterium, and Flavobacterium. The scum was analyzed biochemically for free sugar, total sugar, protein, amino acid nitrogen and total fat. From a comparative study of the types recorded for raw water and the viscous scum, it was found that Micrococcus was most abundant (40 percent), and 30, 20, and 10 percent respectively, were Sarcina, Brevibacterium, and Flavobacterium. Brevibacterium was the only group found in both the raw wastewater and the viscous scum. Flavobacterium, Micrococcus and Sarcina, which were found in fairly large numbers in raw wastewater, were not recorded in the viscous scum. (Byrd-Battelle)
W73-00299

BIOLOGICAL CONTROL OF ACID MINE POLLUTION,
Harvard Univ., Cambridge, Mass.
For primary bibliographic entry see Field 05G.
W73-00300

RECOVERY OF GRAM NEGATIVE BACTERIA WITH HEKTOEN AGAR,
Pennsylvania Water and Gas Co., Scranton.
J. F. Calabro, B. J. Cosenza, and J. J. Kolega.
Journal Water Pollution Control Federation, Vol. 44, No. 3, p 491-493, March 1972. 2 fig, 3 ref.

Descriptors: *Waste water (Pollution), E. coli, Cultures, Septic tanks, Aqueous solutions, Coliforms, Aerobic bacteria, Water pollution, Assay, Aquatic microorganisms, Separation techniques, Enteric bacteria, Pathogenic bacteria.
Identifiers: *Gram negative bacteria, *Hektoen agar, *Selective media, Salmonella typhimurium, Citrobacter freundii, Mima, Herellea, Alcaligenes, Pseudomonas aeruginosa, Streptococcus fecalis, Shigella flexneri, Culture media, Survival.

Hektoen agar was evaluated as a medium for the assay of gram negative bacteria from septic tank wastewater. The survival time of the biological marker Salmonella typhimurium in an operating septic tank was also recorded. The following types of microbial colonies were visually differentiated after a 48 hour incubation in Hektoen agar: E. coli, Citrobacter freundii, Mima-Herellea group, Alcaligenes, Pseudomonas aeruginosa, and Streptococcus faecalis; Salmonella typhimurium and Shigella flexneri were also included as reference cultures. Once the colonies were differentiated, Salmonella typhimurium was used to study survival time in the septic tank wastewater. This experiment indicated that the survival time was approximately 2 weeks in an operative septic tank. The results of the study using Hektoen agar indicated that Salmonella typhimurium is unable to compete with other less fastidious types of microorganisms present in the system. From the evidence presented, it appears that enteric pathogens die out within a relatively short time and do not pose any immediate danger to handlers of septic tank wastewater. (Byrd-Battelle)
W73-00301

HEXACHLOROBENZENE (HCB) IN THE EGGS OF COMMON TERNS IN HAMILTON HARBOUR, ONTARIO,
Canadian Wildlife Service, Ottawa (Ontario).
For primary bibliographic entry see Field 05A.
W73-00309

ORGANIC POLLUTANTS FROM MILL PERSIST IN DOWNSTREAM WASTES,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
A. W. Garrison, and D. W. Hill.
American Dyestuff Reporter, February 1972. 3 p, 6 fig, 2 tab, 6 ref.

Descriptors: *Dieldrin, *Industrial wastes, *Dyes, Gas chromatography, Lagoons, Anaerobic digestion, Biodegradation, Water pollution sources, Surfactants, Water analysis, Path of pollutants, Organic compounds, Water pollution, Streams, Chlorinated hydrocarbon pesticides, Nuclear magnetic resonance, Mass spectrometry.
Identifiers: *p-nonylphenol, Acetophenone, Dye carriers, Metabolites, Carpet mills, Electron capture gas chromatography, a-methylbenzyl alcohol.

Dieldrin and p-nonylphenol found in stream water were identified as pollutants from a carpet yarn mill. Dieldrin was determined by gas chromatography and mass spectrometry. P-nonylphenol was determined by infrared, NMR, and mass spectrometric analysis. The concentrations of these pollutants in the mill wastes and at points downstream showed that anaerobic lagoons (the carpet yarn mill waste treatment facility) discharge the same concentration of dieldrin as that in their influent, 0.4 mg per liter. Nonylphenol is produced in the anaerobic lagoons, presumably by biological degradation of a surfactant. Laboratory studies of nine dye carriers exposed to bacterial, physical, and chemical action in aqueous systems showed that all except the extremely volatile compounds are persistent enough to become water pollutants after passing through non-aerated or aerated lagoons. Acetophenone is a metabolite of alpha-methylbenzyl alcohol in both aerobic and anaerobic sludge. (Snyder-Battelle)
W73-00312

POLLUTION STUDIES OF THE REGIONAL OGALLALA AQUIFER AT PORTALES, NEW MEXICO,
New Mexico State Univ., University Park. Water Resources Research Inst.
R. G. Taylor.
Available from the National Technical Information Service as PB-212 412, $3.00 in paper copy, $0.95 in microfiche. New Mexico Water Resources Research Institute, Las Cruces, Report No. 008, Partial Completion Report, August 1972, 21 p, 10 fig, 3 tab. OWRR A-034-NMEX (4).

Descriptors: *Coliforms, Water pollution sources, *New Mexico, *Nitrates, Phosphates, Irrigation, Recharge, Rainfall, *E. coli, Hydrogen ion concentration, *Bacteria.
Identifiers: *Ogallala Aquifer, Portales (NMex), Coliform contamination, Soil columns.

Preliminary examination of the aquifer in the vicinity of Portales, New Mexico, indicated the presence of coliform bacteria within a two mile radius of the town of Portales. The presence of these bacterial organisms in the water table at Portales is indicative of recharge to the aquifer. This study has examined both chemical and bacterial parameters of the aquifer and extended the results to elucidate any possible seasonal variations and sources of the pollution in the ground water. Bacterial and chemical analyses were done using techniques in accordance with U.S. Public Health Service standards. Chemical analyses included nitrate, pH, and phosphate. Bacterial analyses were performed using membrane filter techniques. The sampling area consisted of a series of two mile radii, extending a distance of ten miles from the town of Portales. Twenty-two rural wells were sampled. Both bacterial and nitrate contamination was found in varying amounts in most wells sampled and a correlation between the two was established. A relationship was found to exist between nitrate concentration and rainfall during the summer sampling interval. No phosphate contamination was found. Periods of high recharge potential appeared to parallel pH variation. An in vitro study was done to determine if and in what amounts, nitrate was converted to nitrogenous compounds including nitrite in soil columns. It was found that approximately 47% available nitrate was converted to other nitrogenous compounds by Escherichia coli in the columns including nitrite. Throughout the year except for the summer months, little variation in nitrate concentration, coliform density, or pH was observed. (See also W72-14434 and W72-14435)
W73-00314

MICROBIOLOGICAL DECOMPOSITION OF PHENOL: I. ISOLATION AND IDENTIFICATION OF PHENOL METABOLIZING YEASTS, (IN JAPANESE),
Toyama Univ. (Japan). Dept. of Industrial Chemistry.
Nei Nisaburo.
J Ferment Technol. Vol 49, No 8, p 655-660. 1971. Illus. (English summ.).
Identifiers: Activated sludge, Candida-Tropicalis, *Microbial decomposition, Pollutant identification, Industrial wastes, Isolation, Metabolism, Microbiology, *Phenol, Rhodotorula-Glutinis-Var-Glutinis, Sewage, Yeasts.

In order to eliminate phenol in industrial wastes, a screening and isolation of phenol-metabolizing microbes were attempted. A few strains of yeasts which could metabolize phenol actively were isolated from sewage or activated sludge. Taxonomical characteristics of these isolates were examined and 2 of the most active ones were identified as Rhodotorula glutinis var. glutinis and Candida tropicalis, respectively. In media containing phenol of 500 mg/ml, R. glutinis var. glutinis No. 692 and C. tropicalis No. 708 decomposed phenol completely by aerobic cultivation at 30 degree C within 5 or 3 hr, respectively. Decomposition of phenol by the newly isolated strains was compared with that of the several taxonomically related authentic strains from type culture. The authentic strains of R. glutinis var. glutinis also showed significant ability to decompose phenol. In a culture which was successively fed with phenol to the maximum concentration of 500 mg/l at appropriate intervals, R. glutinis var. glutinis No. 692 and C. tropicalis No. 708 could give about 1 mg/ml and 2 mg/ml of cell yield by aerobic cultivation for 18 hr. Copyright 1972, Biological Abstracts, Inc.
W73-00321

SILICA CONTENTS IN THE NORTHWESTERN FLORIDA GULF COAST,
Florida State Univ., Tallahassee. Dept. of Oceanography.
C. F. Stephens, and C. H. Oppenheimer.
Contributions in Marine Science, Vol 16, p 99-108, March 1972. 9 fig, 1 tab, 7 ref.

Descriptors: *Silica, Salinity, Freshwater, Sea water, *Sampling, *Distribution patterns, *Florida, Estuaries, Instrumentation, Phytoplankton, Diatoms, Flow, Nutrients, Water analysis, Sediments, Humic acids.
Identifiers: *St. Marks River, Wacissa River, Aucilla River, Wakulla River, Suwannee River, Fenholloway River, Lake Bradford, Alligator Harbor, Turkey Creek.

Due to the significance of silica as a nutrient for phytoplankton growth, for clay mineral formation, and as a buffering agent, its distribution was studied in the freshwater/seawater transition zones of the St. Marks River estuary and Apalachee Bay, Florida. Samples were taken monthly over an 18-month period from a series of stations, and analyses compared to the surrounding locale. Surface samples were taken by hand, and bottom samples by Niskin Biological Samplers. The water samples were stored on ice in darkness to decrease uptake of silica by growing diatoms. Samples were returned to the laboratory within 6 hours from sampling and refrigerated at 2 C. Silicate content of the surface waters ranged from 240 micrograms-at per 1 in fresh water at 10 miles from the open Apalachee Bay to less than 1 microgram-at per 1 in the Bay where salinity is 3.4 percent. Other areas of the shore estuarine environment showed similarly high silica values and are relative to salinity. Three mechanisms are likely to be involved in the silica loss with increasing salinity: (1) reaction of silicate with electrolytes, especially cations, resulting in mineral formation; (2) adsorption or co-precipitation with suspended solids or colloidal materials in water and sediment; and (3) co-precipitation with humic acids as they enter the seawater and are changed from colloidal to particulate form. (Long-Battelle)
W73-00336

COMPARISON OF THE KINETICS OF THIOSULFATE OXIDATION BY THREE IRON--SULFUR OXIDIZERS,
Northeast Louisiana Univ., Monroe, Dept. of Biology.
H. C. Bounds, and A. R. Colmer.
Canadian Journal of Microbiology, Vol 18, No 6, p 735-740, June 1972. 5 fig, 2 tab, 11 ref.

Descriptors: *Iron bacteria, *Metabolism, *Kinetics, *Pollutant identification, Thiobacillus ferrooxidans, Thiobacillus, Ferrobacillus, Cultures, Manometers, Instrumentation, Pressure, Colorimetry, Water pollution sources, Acid mine water, Systematics, Nutrient removal, Chemical reactions, Oxidation, Sulfur bacteria.
Identifiers: *Thiosulfate, *Tetrathionate, Ferrobacillus ferrooxidans, Ferrobacillus sulfooxidans, Culture media, Substrate utilization, Activation energy.

The iron bacteria, Thiobacillus ferrooxidans, Ferrobacillus ferrooxidans, and Ferrobacillus sulfooxidans, originally isolated from acidic waters of bituminous coal mines of West Virginia and Pennsylvania, were characterized via a kinetic study of their thiosulfate metabolism. This was based on the disappearance of thiosulfate and tetrathionate which was determined colorimetrically from culture media containing the three organisms. Determinations were performed under varying conditions of temperature, pH, and oxygen tension. The sulfur metabolism of Thiobacillus ferrooxidans, Ferrobacillus ferrooxidans, and Ferrobacillus sulfooxidans was found to differ in the rate of utilization of thiosulfate and tetrathionate, with tetrathionate showing the most significant difference between the three organisms. The apparent K sub m values of the three organisms ranged from 0.02-0.05 M for T. ferrooxidans and F. sulfooxidans to 5-7 for F. ferrooxidans. Increasing the temperature caused a greater effect on thiosulfate oxidation by F. ferrooxidans than with the other two as shown by the apparent activation energy values. The initial pH of the medium determined the rate of thiosulfate oxidation. If the initial pH was 4.0-4.5, a sharp break in oxygen uptake was shown by T. ferrooxidans and F. sulfooxidans after 20-30 min, but not with F. ferrooxidans. (Long-Battelle)
W73-00338

PENETRATION OF HIGH ENERGY ELECTRONS IN WATER,
Victoria Hospital, London (Ontario).
J. Van Dyk, and J. C. F. MacDonald.
Phys Med Biol. Vol 17, No 1, p 52-55. 1972. Illus.
Identifiers: *Electrons, Penetration, Water pollution sources, *Radioactivity, *Kinetic energy.

Relatively few studies were made of the ultimate fate of electrons after their kinetic energy was dissipated in collisional and radiative processes. An experimental evaluation of the parameters involved in charge deposition from high energy electron beams in H2O is described. Experimental and theoretical values of the parameters are compared, and a qualitative explanation of the differences is given.–Copyright 1972, Biological Abstracts, Inc.
W73-00339

METABOLIC TRANSFORMATION OF DDT, DIELDRIN, ALDRIN, AND ENDRIN BY MARINE MICROORGANISMS,
Wisconsin Univ., Madison. Dept. of Entomology.
K. C. Patil, F. Matsumura, and G. M. Boush.
Environmental Science and Technology, Vol 6, No 7, p 629-632, July 1972. 2 fig, 3 tab, 16 ref.

Descriptors: *Chlorinated hydrocarbon pesticides, Sea water, *Metabolism, Biodegradation, *Marine microorganisms, *Microbial degradation, *DDT, *Dieldrin, *Aldrin, *Endrin, Marine algae, Bottom sediments, Plankton, Radioactivity techniques, Monitoring, Surface waters, Persistence, Path of pollutants, Oceans, Estuaries, Cultures, Sampling, Hawaii, Separation techniques, Films.
Identifiers: *Biotransformation, Biological samples, Fate of pollutants, Metabolites, Dunaliella, Agmenellum quadraplicatum, C-14, Thin layer chromatography, Cleanup, Radioautography, Substrate utilization.

A study was made of the metabolism of chlorinated hydrocarbon pesticides in seawater to determine their biodegradation in a marine environment. Samples of seawater, bottom sediments, surface films, algae, and marine plankton collected in Oahu, Hawaii were treated with radiolabeled insecticides at the collection site and cultured for 30 days at 23 C in the laboratory. Microorganisms isolated from the samples were monitored for metabolic activity along with laboratory cultures of unicellular algae. These microbial cultures were also labelled and kept for 30 days in an incubator at 30 C. Thin-layer chromatographic techniques were used to identify metabolites after chloroform extraction of water samples. The most significant result of the study was that the insecticides were not metabolized in plain seawater; even in relatively polluted waters they were not degraded. Sea bottom sediments showed only slight degradation activity. Most degradation activity was associated with biological samples such as algae, plankton, and surface films. A number of microorganisms in pure culture also showed metabolic activities with patterns similar to those observed in field collected samples. (Mortland-Battelle)
W73-00361

ECOLOGICAL ENERGETICS OF THE SEA--WEED ZONE IN A MARINE BAY ON THE ATLANTIC COAST OF CANADA. II. PRODUCTIVITY OF THE SEAWEEDS,
Bedford Inst., Dartmouth (Nova Scotia).
For primary bibliographic entry see Field 05C.
W73-00366

ENVIRONMENTAL FACTORS AFFECTING THE STANDING CROP OF FORAMINIFERA IN SUBLITTORAL AND PSAMMOLITTORAL COMMUNITIES OF A LONG ISLAND SALT MARSH,
City Coll., New York. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W73-00367

ORGANOCHLORINES AND MERCURY IN COMMON EGRETS AND GREAT BLUE HERONS,
Wisconsin Univ., Madison. Dept. of Wildlife Ecology.
For primary bibliographic entry see Field 05C.
W73-00373

TEMPERATURE-INDUCED CHANGES IN THE FORMATION OF SULPHIDE IN A MARINE SEDIMENT,
University Coll. of North Wales, Menai Bridge. Marine Science Labs.
D. B. Nedwell, and G. D. Floodgate.
Marine Biology, Vol 14, No 1, p 18-24, May 1972. 9 fig, 2 tab, 23 ref.

Descriptors: *Sulfur bacteria, *Sediments, Organic compounds, *Sulfates, Cultures, Water temperature, *Oxidation-reduction potential, Bioassay, Sulfur, Pyrite, Sulfites, Seasonal, Winter, Summer, Sulfur compounds, Chemical reactions, Reduction (Chemical), Chemical analysis, Colorimetry, Volumetric analysis, Incubation, Path of pollutants, Sea water.
Identifiers: Sulfureta, Mobilization, Sample preparation, Chemical recovery.

The influence of temperature upon sulfide formation by sulphate-reducing bacteria was investigated with sediment sulfureta incubated at constant temperatures in the laboratory. Sulfide was estimated by the titrimetric method using a standard sodium-thiosulfate solution giving 99 percent efficient recovery. Pyrite was determined using colorimetric determinations with bipyridyl. Redox potential in the sediment was measured with a millivoltmeter using platinum and calomel electrodes. In addition to a decrease in the rate of sulfide formation with temperature, there was a change in the origin of the sulfide. Thus, at 5 and 10 C, the majority of sulfide originated from organic sulfur, while sulfate contributed the greater proportion of the sulfide at 20 and 30 C. Such changes presumably reflect those in the natural environment during winter and summer. (Snyder-Battelle)
W73-00377

PRODUCTION OF DISSOLVED ORGANIC MATTER FROM DEAD GREEN ALGAL CELLS. I. AEROBIC MICROBIAL DECOMPOSITION,
Tokyo Metropolitan Univ. (Japan). Dept. of Chemistry.
For primary bibliographic entry see Field 05C.
W73-00379

UTILIZATION OF UREA BY SOME MARINE PHYTOPLANKTERS,
Woods Hole Oceanographic Institution, Mass.
For primary bibliographic entry see Field 05C.
W73-00380

THE POSSIBLE IMPORTANCE OF FECAL MATERIAL IN THE BIOLOGICAL AMPLIFICATION OF TRACE AND HEAVY METALS,
Stanford Univ., Pacific Grove, Calif. Hopkins Marine Station.
P. N. Boothe, and G. A. Knauer.
Limnology and Oceanography, Vol 17, No 2, p 270-274, March 1972. 2 tab, 25 ref.

Descriptors: *Path of pollutants, *Trace elements, *Heavy metals, Trophic level, Food chains, Chemical analysis, Sea water, Water pollution sources, Phaeophyta, Kelps, Crabs, Cadmium, Cobalt, Cycling nutrients, Lead, Zinc, Iron, Manganese, Chromium, Copper, Aqueous solutions, Crustaceans.
Identifiers: *Biological magnification, *Feces, Atomic absorption spectrophotometry, Macrocystis pyrifera, Pugettia producta, Arsenic, Detection limits, Sample preparation.

The significance of fecal material in the biological amplification of trace and heavy metals was studied by measuring the concentrations of As, Cd, Co, Cr, Cu, Fe, Mn, Pb, and Zn in the brown alga, Macrocystis pyrifera, and in fecal material of the crab Pugettia producta (fed exclusively on M. pyrifera) by atomic absorption spectroscopy. In this closed system consisting of a primary producer and a primary consumer, the magnitude of concentration of these elements in the resulting feces of the consumer was determined. Except for Cr and Cd, whose concentrations in the fecal material were less than in the kelp, all other elements showed levels in the feces 2.3-14 times those in the algae. These data strengthen the suggestion that fecal material may play a significant role in the cycling of elements in the marine environment. (Byrd-Battelle)
W73-00381

SIGNIFICANCE TO EUTROPHICATION OF SPATIAL DIFFERENCES IN NUTRIENTS AND DIATOMS IN LAKE MICHIGAN,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
For primary bibliographic entry see Field 05C.
W73-00384

EFFECTS ON GROUNDWATER,
Hawaii Univ., Honolulu.
R. H. F. Young.
Journal Water Pollution Control Federation, Vol 44, No 6, p 1208-1211, June 1972. 26 ref.

Descriptors: Groundwater, *Water pollution, Water pollution effects, *Groundwater movement, Water pollution sources, Gasoline, Salts, Sodium chloride, Feed lots, Bicarbonates, Landfills, Pesticides, DDT, DDE, Insecticides, Dieldrin, Waste disposal, Water reuse, Sanitary engineering, *Infiltration, Leachate, *Permeability, Fertilizers, Herbicides, Aquifers, *Reviews, Chlorinated hydrocarbon pesticides, Organophosphorus pesticides, Gas chromatograpy, *Path of pollutants.
Identifiers: Toxaphene, Paper chromatography.

Essential information is presented from the publications and research of various workers on the subject of transport, infiltration, and effects of pollutants on groundwater and its movement. Pollutants entering such systems range from gasoline, pesticides and leachate to highway salt, and appear dependent upon many chemical and physical factors for the degree of their infiltration and concentration. According to one study, such factors are dependent mainly on surface and subsurface geology, depth to water, thickness of groundwater zone, and differences in vertical and lateral permeabilities of aquifers. Measurement of this pollution is accomplished by suction lysimeters, core sampling, and laboratory characterization (e.g. chromatography) of the pollutants. Knowledge of groundwater systems and pollution vectors allows development of more efficient waste disposal and reclamation programs. (Mackan-Battelle)
W73-00390

TOTAL NITROGEN IN FERTILIZERS,
Missouri Agricultural Experiment Station, Columbia.
P. R. Rexroad.
Journal of the Association of Official Analytical Chemists, Vol 55, No 4, p 707-708, July 1972. 5 ref.

Descriptors: Water pollution sources, *Nitrogen, *Fertilizers, *Chemical analysis, Automation, *Mercury, Copper, Pollutants, Catalysts, Chemical reactions, Heavy metals, Water pollution control, Nitrogen compounds, Zinc, Alkalinity.
Identifiers: *Kjedahl procedure, Chemical digestion.

Automation and mercury pollution are discussed with the recommendation that copper be re-evaluated as a catalyst in Kjeldahl system in order to prevent mercury or other possible pollutants from Kjeldahl systems in gaseous, liquid, or solid forms from contaminating the environment at unsafe levels. An editorial change has been made in method 2.051 of the AOAC's 'Official Methods of

Analysis' to increase the alkalinity of the digestion system. (ByrdaBattelle)
W73-00397

UPTAKE OF BACTERIOPHAGE AND THEIR SUBSEQUENT SURVIVAL IN EDIBLE WEST COAST CRABS AFTER PROCESSING,
Notre Dame Coll., Belmont, Calif. Dept. of Biology.
For primary bibliographic entry see Field 05C.
W73-00419

PHYSIOLOGY OF A NEW FACULTATIVELY AUTOTROPHIC THERMOPHILIC THIOBACILLUS,
Texas Univ., Austin. Dept. of Microbiology.
R. A. D. Williams, and D. S. Hoare.
Journal of General Microbiology, Vol 70, p 555-566, 1972. 1 fig, 6 tab, 42 ref.

Descriptors: *Thermophilic bacteria, Cultures, Sufur bacteria, Freshwater, Pollutant identification, Biochemistry, Biological properties, Water pollution sources, Water pollution.
Identifiers: *Thiobacillus, *Bacterial physiology, Autotrophic bacteria, Yellowstone National Park, Biochemical tests, Substrate utilization, Thiosulfate, Culture media, DNA, Enrichment.

A new thermophilic thiobacillus (G plus C equals 66.2 mol percent) has been isolated in pure culture. This facultatively autotrophic non-spore-forming thermophile was isolated from water samples collected at Yellowstone National Park. The temperature optimum for growth was 50 degrees. Heterotrophic growth occurred on nutrient broth, but not on single organic compounds. No alpha-keto-glutarate dehydrogenase was present, but unrestricted acetate incorporation took place via the glyoxylate cycle. (Byrd-Battelle)
W73-00422

WATER RELATIONS OF SALMONELLA ORANIENBURG: ACCUMULATION OF POTASSIUM AND AMINO ACIDS DURING RESPIRATION,
Commonwealth Scientific and Industrial Research Organization, North Ryde (Australia). Div. of Food Research.
For primary bibliographic entry see Field 05C.
W73-00423

PRIMARY PRODUCTION AT THE THERMOCLINE LEVEL IN THE NERITIC ZONE OF THE NORTH-OCCIDENTAL MEDITERRANEAN, (PRODUCTION PRIMAIRE AU NIVEAU DE LA THERMOCLINE EN ZONE NERITIQUE DE MEDITERRANEE NORD-OCCIDENTALE),
Arago Lab., Banyuls-sur-Mer (France).
For primary bibliographic entry see Field 05C.
W73-00431

ON THE ROLE OF BIOLOGICAL FACTORS IN THE SEDIMENTATION OF IRON, MANGANESE AND COBALT AND IN THE FORMATION OF NODULES (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
For primary bibliographic entry see Field 05C.
W73-00433

BIOCHEMICAL COMPOSITION OF SUSPENDED ORGANIC MATTER FROM THE TROPICAL PACIFIC (IN RUSSIAN),
Akademiya Nauk SSSR, Kaliningrad. Institut Okeanologii.
A. I. Agatova, and Yu. A. Bogdanov.
Okeanologiya, Vol 12, No 2, p 267-276, March/April 1972. 7 tab, 10 ref.

Descriptors: *Bottom sediments, *Suspended solids, *Decomposing organic matter, *Pacific Ocean, *Water pollution sources, Sedimentation, Plankton, Humic acids, Sea water, Lipids, Pollutant identification, Biological properties, Carbohydrates, Organic compounds, Sediments, Path of pollutants.
Identifiers: *Biochemical composition, Albumin, Nucleic acids.

Plankton is the main source of organic matter of the bottom sediments. The biochemical composition of organic matter changes essentially as the latter passes from plankton through suspended material to bottom sediments. When passing from the 'living' organic matter to the 'dead' one which is the major constituent of suspended material, the content of such freely hydrolyzed components as albumin and nucleic acids decreases. The content of lipids and carbohydrates in organic matter of suspended material is somewhat higher than that of plankton. Lipids are among the most stable components of primary organic matter. The interaction of carbohydrates with other organic compounds leads to the formation of humic compounds. The same tendency in the changes of the biochemical composition of organic matter is apparent when passing from the surface to the deep-water suspended material and further to the bottom sediments. (Long-Battelle)
W73-00434

LOCALIZATION OF OXIDATION OF N-PARAFFINS BY YEASTS,
Moskovakaya Selskokhozyaistvennaya Akademiya (USSR).
V. V. Rachinskii, E. G. Davidova, and A. I. Lapotyshkina.
Doklady Biological Sciences, Vol 200, No 1-6, p 608-610, September/October 1971. 4 fig, 9 ref. Translated from Doklady Akademii Nauk SSSR, Vol 200, No 2, p 457-460, September 1971.

Descriptors: *Yeasts, *Oxidation, *Microbial degradation, Carbon radioisotopes, Chemical reactions, Absorption, Cytological studies, *Radioactivity techniques, Marking techniques, Metabolism, Nutrients, Cultures, Biomass, Separation techniques, Alcohols, Ethers, Solvent extractions, Organic compounds.
Identifiers: *Paraffins, Candida tropicalis, Heptadecane, Octadecane, Aliphatic hydrocarbons, Substrate utilization, Fate of pollutants, C-14, Culture media, Column chromatography, Fatty acids, Protoplasts.

Radioactive indicators were employed to study sites of n-paraffin (hydrocarbon) oxidation in a microbial cell. To accomplish this, the incorporation of C-14-labeled heptadecane or octadecane was measured in yeast (Candida tropicalis) cells and protoplasts. Chromatographic analysis of cell extracts showed that only those cells pre-exposed to n-paraffins were able to accumulate the C-14 hydrocarbons, indicating an inducible system for their uptake and subsequent oxidation. Kinetic analysis of labeled hydrocarbons taken up and labeled C02 given off by both yeast cells and protoplasts yielded identical rates of oxidation, thereby eliminating the possibility of extracellular or membrane-linked enzymatic oxidation. Intracellular and cytoplasmic sites need further investigation. (Long-Battelle)
W73-00439

DEGRADATION OF DDT IN SOIL UNDER THE INFLUENCE OF MICROORGANISMS,
All-Union Scientific Research Inst. of Chemical Means of Protecting Plants, Moscow (USSR).
E. G. Drui, K. A. Gar, and V. S. Khokhryakova.
Doklady Biological Sciences, Vol 200, No 1-6, p 611-613, September/October 1971. 1 fig, 2 tab, 6 ref. Translated from Doklady Akademii Nauk SSSR, Vol 200, No 4, p 977-979, October 1971.

Descriptors: *DDT, *Soil microorganisms, *Microbial degradation, *Soil contamination, Chlorinated hydrocarbon pesticides, Temperature, Nutrition, DDE, DDD, Aeration, Cultures, Nitrogen, Chemical reactions, Pollutant identification, Anaerobic conditions, Aerobic conditions, Pesticide toxicity, Metabolism.
Identifiers: Culture media, 4 4'- DDT, 2 4' DDT, Detoxification, Chernozemic soil, Thin layer chromatography, Fate of pollutants, Dehydrochlorination, Substrate utilization, Metabolites.

The DDT biodegradative activities of soil microorganisms were investigated under varying conditions of temperature, aeration, and nutrition. To establish the participation of soil microflora in the process of DDT metabolism, 100 ml of Czapek medium containing 500 micrograms 4,4'-DDT was inoculated with 1 g of soil. Quantitative changes in the content of DDT in the media were determined by thin-layer chromatography. The results of the experiment after 4 weeks' incubation at 30 C showed that the soil microorganisms at their optimal conditions for growth almost completely destroyed 4,4'-DDT. In so doing, metabolism of 4,4'-DDT resulted in about 50 percent being converted to DDD, and the rest apparently was broken down to water-soluble and volatile products. Experiments excluding sugar from the nutrient medium, analyzed after 5 weeks' incubation, showed that DDD was increased 15-fold. As the data show, in unsterile soil, where favorable conditions (temperature, moisture) for the activity of the microflora were created, DDT was transformed significantly more rapidly than in sterile conditions, the main pathway of DDT transformation being dehydrochlorination to DDE under aerobic conditions and reduction of the dehydrochlorinate to DDD under anaerobic conditions. Study of the transformation in soil of pure products of DDE and DDD showed that in time they too were broken down, being converted into volatile or water-soluble products. In anaerobic conditions the metabolic process proceeds significantly more rapidly than in aerobic conditions. (Long-Battelle)
W73-00440

INTERREGULATION OF MARINE PLANKTONIC DIATOMS IN MONO-AND MIXED CULTURES, (IN RUSSIAN),
Moscow State Univ. (USSR).
For primary bibliographic entry see Field 05C.
W73-00441

VERTICAL DISTRIBUTION AND DIEL MIGRATIONS OF CHAETOGNATHS IN THE TROPICAL PACIFIC, (IN RUSSIAN),
Akademiya Nauk SSSR, Kaliningrad. Institut Okeanologii.
E. G. Kolosova.
Okeanologiya, Vol 12, No 1, p 129-136, January/February 1972. 4 fig, 4 tab, 22 ref.

Descriptors: *Pacific Ocean, *Vertical migration, *Spatial distribution, Distribution patterns, Sampling, Depth, Invertebrates, Worms, Marine animals, Sea water, Ecological distribution, Zooplankton, Biorhythms, Tropical regions, Water temperature.
Identifiers: *Chaetognaths, *Diel migration.

The vertical distribution of eight chaetognath species was studied using materials collected at diurnal station No 6033 of the 44th 'Vityaz' cruise taken at the boundary between the equatorial and the southern tropical water structures of the Pacific. The species can be divided into two groups based on their distribution patterns. The first group includes species whose population cores are found in the upper 150 to 200 m layer, and the second embraces species with the population cores at depths below 150 or 200 m. The species of the first group are characterized by pronounced vertical migrations. As for the second

group, it is impossible to judge the vertical distribution of its species. The comparison of these data (the Pacific Ocean) with those of Ovra (the Atlantic Ocean) shows that in both regions the population cores of the same species are found at approximately the same depths, though water temperatures there differ by almost 10 degrees. It is suggested that temperature does not determine the vertical distribution of the species. (Long-Battelle)
W73-00443

SOME DATA ON THE QUANTITATIVE DISTRIBUTION AND FEEDING SIGNIFICANCE OF BENTHOS FROM THE SHELF WATERS OF WEST PAKISTAN, (IN RUSSIAN),
Azovo-Chernomorskii Nauchno-Issledovatelskii Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Kerch (USSR).
M. S. Savich.
Okeanologiya, Vol 12, No 1, p 137-143, January/February 1972. 5 fig, 3 tab, 7 ref.

Descriptors: *Distribution patterns, *Benthos, *Bottom sampling, *Sea water, Marine fish, Depth, Bottom sediments, Food abundance, Ecological distribution, Spatial distribution, Equipment.
Identifiers: Okean-50 bottom sampler, *Pakistan.

Eighty benthic samples were collected with the 'Okean-50' bottom sampler on the West Pakistan shelf in January and March 1969. The quantitative distribution of bottom organisms is characterized as dependent on depth and bottom sediment composition. A relation was found between the quantity of food and the sizes of catches of the most mass benthos-feeding fish. Specific composition of its food is discussed. (Long-Battelle)
W73-00444

DECAY OF PEAK CONCENTRATION IN UNIFORM FLOW WITH FINITE DURATIONS OF INJECTION,
Howard Univ., Washington, D.C. Dept. of Civil Engineering.
C. -L. Yen.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Vol I, p 69-76, 1972 (release date). 5 fig, 7 ref.

Descriptors: *Path of pollutants, *Dispersion, *Mixing, *Uniform flow, *Turbulent flow, Model studies, Hydraulic models, Pipe flow, Closed conduit flow.

Theoretical analysis and experimental results for the decay of peak concentration in uniform turbulent flow with finite injection-lengths are presented. An 'effective dispersion coefficient' is defined and evaluated from the experimental data. With the assumption of similarity among concentration-defect profiles, the peak concentration can be expressed as an error-function of a parameter characterizing the relative importance of the injection-length to the square root of the product of time and dispersion coefficient. Experiments carried out in a transparent pipe confirm the theoretical analysis. Evaluations of experimental data indicate that the 'effective dispersion coefficient' is lower for larger injection-lengths. (Knapp-USGS)
W73-00552

ON THE THEORY OF TURBULENT DISPERSION OF SOLUBLE MATTER IN THE FLOWS OF IRREGULAR CROSS-SECTION,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulic and Water Power.
M. Sumer.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Vol I, p 77-84, 1972 (release date). 1 fig, 21 ref.

Descriptors: *Turbulent flow, *Dispersion, *Mass transfer, Mixing, Diffusion, Turbulence, Path of pollutants, Mathematical studies, Uniform flow, Open channel flow.

A flow field of straight alignment and irregular cross-section is considered. Part of the boundary of the cross-section consists of a free surface and the remaining part is considered as a wall. The turbulent diffusion coefficient is assumed to be a tensor of second order. Under these conditions, it is shown that the equation of conservation can be transformed into a one-dimensional diffusion equation asymptotically. Applying the Aris' moment method to this case, it is found that matter is conserved, the center of mass moves with the mean flow velocity, and the variance of the distribution depends on the time linearly. (Knapp-USGS)
W73-00553

COMPARISON OF THE EFFECTS OF SUPERFICIAL DIFFUSION IN A SCALE MODEL AND IN THE ST. LAWRENCE RIVER (COMPARAISON DES EFFETS DE DIFFUSION SUPERFICIELLE SUR MODELE REDUIT ET DANS LE FLEUVE ST. LAURENT),
Laval Univ., Quebec. Faculty of Sciences.
J. -L. Verrette.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Vol I, p 85-92, 1972 (release date). 4 fig, 8 ref.

Descriptors: *Turbulent flow, *Dispersion, *Mass transfer, Mixing, Diffusion, Turbulence, Path of pollutants, Mathematical studies, Uniform flow, Open channel flow, Model studies, Hydraulic models.
Identifiers: *St. Lawrence River.

Field measurements in the St. Lawrence River on superficial turbulent diffusion show that the lateral spreading (diffusion) increases with the velocity. This lateral spreading cannot keep growing indefinitely with the velocity. The standard deviation used in defining the spreading should reach an upper limit or a maximum value. Analysis conducted in the laboratory on superficial turbulent diffusion in homogeneous turbulent field with small polyethylene particles confirms the fact that the standard deviation increases rapidly and reaches a maximum value before going down very slowly as the Reynolds' number is increased. The maximum spreading of the particles occurs for a Reynolds' number of about 260,000. (Knapp-USGS)
W73-00554

CALCULATIONS OF PASSIVE ADDITION SPREADING IN A TURBULENT FLOW,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Kharkov (USSR).
For primary bibliographic entry see Field 08B.
W73-00556

SEDIMENT-LADEN SUBMERGED HORIZONTAL JET,
Norges Tekniske Hoegskole, Trondheim. River and Harbor Lab.
For primary bibliographic entry see Field 02J.
W73-00560

ON BUOYANT JETS,
Tetra Tech, Inc., Pasadena, Calif.
R. C. Y. Koh.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 145-156, 1972 (release date). 7 fig, 5 ref.

Descriptors: *Jets, *Stratified flow, *Thermal stratification, *Buoyancy, *Diffusion, Mixing, Turbulent flow, Momentum transfer, Energy transfer, Path of pollutants.
Identifiers: *Buoyant jets.

Multiple fully submerged round jets are analyzed, including analysis of the effect of jet interference. This is the case in typical multiport sewage outfall diffusers. Nomographs are presented by means of which mixing characteristics can be extracted. The case of two-dimensional horizontal surface buoyant jets is also analyzed. The behavior of such jets can be entirely different from fully submerged ones. In a fully submerged buoyant jet, the effect of the jet buoyancy is manifested in a bending of the jet path upwards; no such bending is possible if the buoyant jet is at the surface. The actual flow pattern depends strongly on the interplay of the various physical mechanisms including entrainment at the jet boundary, interfacial shear between the buoyant fluid and the ambient fluid, jet momentum and buoyancy, and surface loss of buoyancy. The flow pattern of surface jets exhibit jet-like behavior, or behavior nearly that of a two-layer stratified flow. Under some conditions, an internal hydraulic jump may develop. (Knapp-USGS)
W73-00561

TURBULENT BUOYANT JETS OF EFFLUENT DISCHARGED VERTICALLY UPWARDS FROM AN ORIFICE IN A CROSS-CURRENT IN THE OCEAN,
Chuo Univ., Tokyo (Japan).
T. Hayashi.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 157-165, 1972 (release date). 8 fig, 1 photo, 6 ref, append.

Descriptors: *Jets, *Stratified flow, *Thermal stratification, *Diffusion, *Buoyancy, Mixing, Turbulent flow, Momentum transfer, Energy transfer, Path of pollutants.
Identifiers: *Buoyant jets.

Marine disposal of sewage is often by discharge of the effluent through ocean outfalls placed on the bottom of the sea. It has been theoretically assumed that the sewage effluent discharged from a port in a cross current in the ocean forms a bent-over plume. In laboratory experiments carried out at Hydraulic Laboratory, Chuo University, sometimes a bent-over plume split sideways into two concentrated regions with a clear space between them. In such a case serious contamination of the coastal area may sometimes result because half of the effluent can move toward the coast even when the current is parallel to the coast. The experiment performed and the mathematical analysis made on this splitting behavior of bent-over plumes are described. (Knapp-USGS)
W73-00562

PHENOMENA OF TRANSFER IN A COUNTER-CURRENT JET (PHENOMENES DE TRANSFERT DANS LE CAS D'UN JET A CONTRECOURANT),
Sir George Williams Univ., Montreal (Quebec).
A. S. Ramamurthy, L. Robillard, and T. C. Lin.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 167-174, 1972 (release date). 6 fig, 2 tab, 2 ref.

Descriptors: *Jets, *Mixing, *Turbulence, *Turbulent flow, Reynolds number, Vortices, Outlets, Path of pollutants, Mass transfer, Momentum transfer, Eddies.
Identifiers: Countercurrent jets.

A counterjet mixing problem is often found when discharging wastes through large injecting devices. The interference of the device inhibits the oscillation of the jet and reduces the scale of mixing. A hysteresis effect is associated with the threshold velocity for jet injection. A few hot film surveys conducted in the jet wake for large injecting velocities indicate that the turbulent scales associated with the jet oscillation predominate even when an interfering body is present. A universal relation was found between the Reynolds number and the Strouhal number based on jet oscillating frequency. (Knapp-USGS)
W73-00563

VELOCITY DISTRIBUTION FAR OFF DOWNSTREAM AT THE WATER SURFACE OF A SUBMERGED JET,
Imatran Voima Osakeyhtio, Helsinki (Finland) Nuclear Power Project Group.
Y. S. El Mahgary.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 175-182, 1972 (release date). 11 fig, 5 ref.

Descriptors: *Jets, *Mixing, *Momentum transfer, Turbulent flow, Velocity, Path of pollutants, Dispersion.

Experiments were carried out to determine the velocity distribution at the surface, far downstream from a jet. In this region, the Schlichting solution for the free jet cannot be applied directly. The effect of Reynolds number and the submersion depth were both studied. The velocity profiles deviate considerably from the free jet profile at higher Reynolds numbers, whereas the velocity drop along the axis of a submerged jet can be represented roughly by the free jet law. The velocity drop is lessened by decreasing the submersion depth. (Knapp-USGS)
W73-00564

SURFACE JET AND DIFFUSION MODELS FOR DISCHARGE OF HEATED WATER,
Vanderbilt Univ., Nashville, Tenn.
B. A. Benedict, E. M. Polk, Jr., E. L. Yandell, Jr., and F. L. Parker.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 183-190, 1972 (release date). 4 fig, 1 tab, 10 ref.

Descriptors: *Jets, *Mixing, *Heated water, *Path of pollutants, Dispersion, Thermal pollution, Lakes, Streams, Model studies, Diffusion.

Temperature distributions resulting from heated water discharges into lakes and rivers were defined using analytical, field, and laboratory work. Two solutions of the two-dimensional diffusion equations were developed, one for an unbounded receiving stream and one for a laterally bounded stream. A diffusion coefficient (Dy) is needed to use the model as a predictive tool. Another model treating the discharge as a heated surface jet has been developed. Two empirical coefficients are needed: an entrainment coefficient, (E) and a drag coefficient, (CD). The ratio, (A) of the ambient velocity to the initial jet velocity is the most important parameter. Values of Dy, and the properties of the zone of flow establishment, needed for the jet model, are closely related to A. CD is a function of a jet Reynolds number, while E is primarily a function of geometric constraints. For A > 0.8, the diffusion models can be applied adequately. Below this value, the plume centerline trajectory can only be adequately predicted by the jet model. (Knapp-USGS)
W73-00565

CURRENTS INDUCED IN WATER BY SETTLING SOLIDS,
Manchester Univ., (England).
For primary bibliographic entry see Field 02J.
W73-00566

TWO-LAYER DENSITY-STRATIFIED FLOW IN AN OPEN-CHANNEL BEND,
Iowa Univ., Iowa City, Inst. of Hydraulic Research.
For primary bibliographic entry see Field 08B.
W73-00567

LABORATORY INVESTIGATION ON HEAT TRANSFER IN THERMALLY STRATIFIED FLOW,
Polish Academy of Sciences, Gdansk. Inst. of Hydraulic Research.
W. Majewski.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 207-216, 1972 (release date). 7 fig.

Descriptors: *Stratified flow, *Thermal stratification, *Mixing, *Mass transfer, *Heat transfer, Turbulence, Turbulent flow, Convection, Uniform flow, Model studies, Hydraulic models, Flumes.

Heat transfer in flowing water is caused mainly by turbulent diffusion and mixing of warm and cold water. A hydrothermal laboratory investigation determines the mixing process and stability conditions in thermally stratified flow. Temperature and velocity distributions were determined in two-dimensional, uniform flow, as well as changes in temperature distribution along the hydraulic flume. The influence of the depth of cold water layer on thermal phenomena was also assessed. Experiments were carried out in a horizontal hydraulic flume. The depths of stratified flow were 0.50; 0.30, and 0.20 m. It was possible to achieve conditions from fully separated two-layered stratified flow to complete mixing of warm and cold layers. (Knapp-USGS)
W73-00568

RESEARCH INVESTIGATION OF TRANSFER PROCESS IN TWO-DIMENSIONAL STRATIFIED FLOW,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Moscow (USSR).
I. A. Sherenkov, A. P. Netjukhailo, and E. D. Telezhkin.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 217-225, 1972 (release date). 11 fig, 11 ref.

Descriptors: *Stratified flow, *Thermal stratification, *Mixing, *Mass transfer, *Heat transfer, Turbulence, Turbulent flow, Convection, Uniform flow, Model studies, Hydraulic models, Flumes.

The process of development or breakup of stratified flows at the transition from stable stratification to neutral stratification depends essentially on momentum and heat transfer, or on exchange across a fluid-density interface. Experiments were carried out in a flume. Both concurrent and countercurrent flows of upper and lower layers may be produced. The flume also provided for formation of unsteady transition regimes. Waves on the free flow surface in the flume may be produced by a wave-maker and by air motion over the free surface. Dynamic and heat diffusive boundary layers include a turbulent zone, where turbulent transfer of momentum, of heat, or mass transfer, occur. In the lower viscous sublayer molecular transfer predominates, and in the intermediate transition sublayer turbulent and molecular transfer are of equal order. With a transition from the turbulent zone to a sublayer, 'Archimedes' forces suppress vertical turbulent disturbances to a great extent, and in a viscous sublayer with stable stratification they cause turbulence to decay. Large-scale vortices in the upper turbulent flow are extincted in a transition layer, without reaching the interface. With increased upper layer velocity or decrease of the density gradient, the velocity gradient, the velocity gradients and the intensity of momentum and heat transfer increase, and internal regular waves are formed. With further increase of velocity, regular waves on the interface become unsteady and disrupted, and larger irregular waves of different mode are formed. The interface decays, and the flow becomes fully turbulent and unstratified. (Knapp-USGS)
W73-00569

SOME CHARACTERISTICS OF DENSITY CURRENTS ESTABLISHED FROM OUTFALLS,
Bristol Univ., (England). Dept. of Civil Engineering.

In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 235-242, 1972 (release date). 3 fig, 5 ref.

Descriptors: *Stratified flow, *Thermal stratification, *Path of pollutants, *Heated water, *Mixing, Froude number, Density, Density currents, Model studies, Hydraulic models, Thermal pollution, Mass transfer, Heat transfer, Momentum transfer, Turbulent flow.

The interfacial stability of density currents resulting from the discharge of heated water into a pool of cold ambient water was studied experimentally. The bed of the pool sloped at a shallow angle. Density profiles were constructed from thermocouple measurements, and from the concentration of dye in samples withdrawn from the flow. A hydrogen bubble technique was developed for measuring flow velocity. The overall characteristics of the stable flow were well represented by a critical densimetric Froude number, which agreed closely with the value given by others for flow expanding freely at inlet. Dimensionless plots of the velocity and density profiles showed that the gradient Richardson number was constant in the interfacial region. (Knapp-USGS)
W73-00571

CRITERIA FOR FULLY-MIXED TEMPERATURE REGIME IN STREAMS,
Tennessee Valley Authority, Norris. Engineering Lab.
For primary bibliographic entry see Field 02E.
W73-00572

FINGEROIMBIBITION IN GROUNDWATER REPLENISHMENT THROUGH INHOMOGENEOUS MEDIUM WITH SLIGHTLY VARYING PHASE DENSITY,
S. V. Regional Coll. of Engineering and Technology, Surat (India). Dept. of Mathematics.
For primary bibliographic entry see Field 02F.
W73-00573

HYDRODYNAMICS OF COLUMNS WITH PARALLEL DENSE STRATIFICATION (HYDRODYNAMIQUE DES COLONNES A LIT DENSE EN PARALLELE),
Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
R. Deruaz.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research,

Paris, August 29-September 3, 1971, Volume I, p 267-274, 1972 (release date). 2 fig, 9 ref.

Descriptors: *Heat transfer, *Cooling towers, *Separation techniques, *Mass transfer, Water cooling, Mixing, Solvent extractions.
Identifiers: Spray columns, Extraction columns.

Liquid-liquid spray cooling or extraction columns can be operated with a dispersed or a dense packing of drops. A dense packing of drops is mainly characterised by a large contact area between the phases and a low axial mixing in the continuous phase. Owing to these properties, the dense packing of drops allows large efficiencies when operating in heat or mass exchange. However, axial mixing phenomena increase with the column diameter, and scaling up to industrial sizes is difficult. A possible solution consists of a system of several parallel columns, the size of each such that axial mixing is low when operating separately. An experimental study of such a system involving 7 columns (6 inches in diameter) confirms the instability of dispersed packing and shows that dense packing fo drops is very stable and insensible to unbalanced flows in the columns. (Knapp-USGS)
W73-00575

HEAT TRANSFER IN A COOLING POND,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki, Leningrad (USSR).
A. G. Averkiev, I. I. Makarov, and K. Ya. Kind.
In: Hydraulic Research and its Impact on the Environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 325-332, 1972 (release date). 7 fig, 1 tab, 4 ref.

Descriptors: *Cooling, *Heat transfer, *Convection, *Density currents, *Reservoirs, Thermal stratification, Density stratification, Mixing, Stratified flow, Hydraulic models, Model studies, Water temperature.
Identifiers: *Cooling ponds, USSR.

Because large resevoirs are commonly used for the water supply of thermal and atomic power plants, it is necessary to study their transfer processes. Heat transfer processes and cooling of water in a pond are governed to a great extent by density currents arising due to thermal stratification. Some laboratory data on stratified flows in rivers and reservoirs used as a source of water supply to thermal power plants are presented. The character of heat transfer in a reservoir is materially affected by the type of the water supply source. Simplified hydraulic models were made of both a river and a deep stagnant pond. Froude's densimetric number is adopted as the main criterion of similitude. For a river the relationship was obtained defining the variation in length of the thermocline versus an increase in Froude's densimetric number. It is suggested that the efficiency of the design of a cooling pond be evaluated using curves plotted from laboratory or field data. (Knapp-USGS)
W73-00579

THERMAL DIFFUSION OF THE WARM WATER OF POWER PLANTS INTO A SEA BASIN,
Imatran Voima Osakeyhtio, Helsinki (Finland).
Y. S. El Mahgary.
In: Hydraulic Research and its Impact on the Environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 333-340, 1972 (release date). 3 fig, 25 ref.

Descriptors: *Heat transfer, *Diffusion, *Thermal powerplants, *Thermal pollution, *Sea water, Coasts, Thermodynamics, Mixing, Thermal stratification, Convection.

The mechanisms of thermal diffusion and heat transfer in a sea basin are subjects of considerable importance. With the construction of power generating and industrial plants along the shores of seas and large lakes, the need for improving understanding of the effects of applying thermal loads to the water bodies is increasing. The equation of thermal diffusion in a sea basin was examined assuming that the coefficient of thermal diffusion increases according to the scale. The relation between the thermal diffusion coefficient and the scale was assumed the same as that between the mass diffusion coefficient and the scale. The change in water enthalpy was separately examined. The common formula used for evaluating the heat of evaporation was modified to take into account the effect of free convection. Also a convenient formula was introduced for the estimation of the net short-wave radiation. (Knapp-USGS)
W73-00580

THE EFFECT OF THE POWER PLANT THERMAL LOAD ON THE BAY OF NAANTALI,
Imatran Voima Osakeyhtio, Helsinki (Finland).
Y. S. El Mahgary.
In: Hydraulic Research and its Impact on the Environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 341-348, 1972 (release date). 12 fig, 3 tab, 4 ref.

Descriptors: *Heat transfer, *Diffusion, *Thermal powerplants, *Thermal pollution, *Sea water, Coasts, Thermodynamics, Mixing, Thermal stratification, Convection.

Field measurements were carried out to determine the effect of discharging the warm cooling water of the Naantali Power Plant (Finland) on the physical and chemical properties of the water in the bay of Naantali. Surveys of water temperature and measurements of the physico-chemical properties of the water at the plant inlet and outlet were carried out four times per year. Meteorological information was also recorded. A sharp drop in the outlet temperature takes place within a few meters from the outlet, and the physico-chemical properties of the water in the bay are subjected to insignificant or no changes. (Knapp-USGS)
W73-00581

TRANSFORMATION OF PROBABILITY CHARACTERISTICS OF POLLUTANTS IN MARINE ENVIRONMENT,
Tallinn Polytechnic Inst. (USSR).
A. M. Aitsam.
In: Hydraulic Research and its Impact on the Environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 383-390, 1972 (release date). 3 ref.

Descriptors: *Path of pollutants, *Sea water, *Mixing, *Probability, Statistical methods, Distribution patterns, Waves (Water), Turbulence, Dispersion.

Transformation of probability characteristics of the pollutant concentration field in the sea environment assumes that the mass transfer process taking place under the influence of phenomena of different energy may be regarded as statistically independent. The calculation scheme is as follows: (1) the transformation of distribution caused by the last energy supply zone (wind zone) is calculated; (2) the transformation of concentration distribution caused by middle energy zone (tidal and seiche zone) is calculated by making use of averages of energy supply velocities and concentrations; (3) the cumulative transformation of probability characteristics of pollutant concentration is calculated. (Knapp-USGS)
W73-00585

RADIOCHEMICAL MONITORING OF WATER AFTER THE CANNIKIN EVENT, AMCHITKA ISLAND, ALASKA, JANUARY 13-APRIL 5, 1972,
Geological Survey, Lakewood, Colo.
L. J. Schroder, and W. C. Ballance.
Available from NTIS, Springfield, Va 22151 - Price $3.00 paper copy; $0.95 cents microfiche. Geological Survey Report USGS-474-159 (Amchitka-35), August 1972. 17 p, 3 fig, 2 tab, 3 ref.

Descriptors: *Chemical analysis, *Water analysis, *Radiochemical analysis, *Alaska, *Tritium, Uranium radioisotopes, Sampling, Sites, Data collections, Correlation analysis, Monitoring, Water pollution sources, Pollutant identification.
Identifiers: *Amchitka Island (Alaska).

The U.S. Geological Survey collected 110 water samples in cooperation with the Atomic Energy Commission, from Amchitka Island, Alaska, between January 13 and April 5, 1972. Tritium determinations were made on all samples collected and gross alpha and gross beta/gamma determinations were made on 92 samples. The gross alpha activity, as U equivalent, ranged from less than 0.4 to 1.7 pCi/liter (picocuries per liter) for the January 1972 sampling and from less than 0.1 to 2.3 pCi/liter for the April 1972 sampling. This compares with a range from less than 0.1 to 23 pCi/liter in fresh waters on Amchitka in 1971. The gross beta activity in water as Cs-137 equivalent ranged from 3.2 to 20 pCi/liter for the January 1972 sampling and from 2.0 to 11 pCi/liter for the April 1972 sampling. This compares with a range from less than 1.0 to 36 pCi/l in fresh waters on Amchitka in 1971. The only water samples having detectable tritium activity, that is, greater than 640 pCi/liter (200 tritium units), were those collected at the Long Shot site. (Woodard-USGS)
W73-00587

ABS AS A GEOLOGICAL TRACER,
Tokyo Metropolitan Univ. (Japan). Dept. of Chemistry.
Y. Ambe.
Nature Physical Science, Vol 239, p 24-25, September 11, 1972. 3 fig, 5 ref.

Descriptors: *Tracers, *Bottom sediments, *Sedimentation rates, *Alkylbenzene sulfonates, Detergents, Deposition (Sediments), Sedimentation, Sedimentology, Path of pollutants.
Identifiers: *Japan.

Alkylbenzenesulphonates (ABS), widely-used components of domestic and industrial synthetic detergents, can be used as tracers to estimate the rate of sedimentation in coastal areas. Samples were taken in December 1969 5 km off the coast of Yokohama Harbor at a water depth of 20 m and near Tokyo, at a water depth of 5 m. Because ABS is chemically stable in the anaerobic condition in the sediment the thickness of the layer containing ABS represents a historical record since the deposition of ABS began. If no disturbances in the stratification of a sediment have occurred, the average rate of sedimentation can be estimated from the ABS distribution. Thus, the average rate of sedimentation was calculated as 3 cm per yr and 7 cm per yr at the same sampling points. (Knapp-USGS)
W73-00594

INTERPRETATION OF THE WATER AND MINERAL NITROGEN PROFILES IN BARE OR STRAW-COVERED PARCELS OF LAND USING A MATHEMATICAL MODEL,
Centre de Recherches Agronomiques de Provence, Antibes (France). Station d'Agronomie et de Physiologie Vegetale.
For primary bibliographic entry see Field 02G.
W73-00607

THE VARIABILITY OF COPPER, ZINC, AND MANGANESE CONTENT IN THE WATER OF SOME RIVERS, STREAMS, AND CARP PONDS,
Polish Academy of Sciences, Krakow. Zaklad Biologii Wod.
K. Pasternak, and A. Antoniewicz.
Acta Hydrobiol. Vol 13, No 3, p 251-268. 1971. Illus.
Identifiers: Carp ponds, *Copper, *Manganese, Pollutant identification, Ponds, Rivers, Seasonal, Streams, *Zinc, Path of pollution, *Atomic absorption spectroscopy.

Microcomponents were determined by atomic absorption spectroscopy. The concentration of these elements in flowing waters and ponds showed a varied differentiation. Changes occurred in the range of variations of each of the examined microelements and in their concentration in the particular streams and ponds, as well as in the course of the season. The least variable microelement was Cu, and Mn the most. The quantitative differentiation of all microcomponents between the streams chiefly depends on the quality of their catchment basin and degree of pollution. Between ponds it depends on the character of the bottom. The seasonal variability of trace elements showed marked dependence on meteorological conditions.--Copyright 1972, Biological Abstracts, Inc.
W73-00625

5C. Effects of Pollution

FEATHER-WETTING IN CLEANED BIRDS,
Newcastle-upon-Tyne Univ. (England). Dept. of Zoology.
R. B. Clark, and K. G. Gregory.
Marine Pollution Bulletin, Vol. 2, No. 5, p 78-79, May 1971. 9 ref.

Descriptors: *Oil pollution, *Birds, *Wettability, *Surfactants, Water pollution effects, Oil, Oil spills, Oily water, Detergents, Cleaning, Solvents.
Identifiers: *Feather wetting, Plumage, Arklone P.

At present, the limiting factor in the rehabilitation of oiled seabirds is the immediate loss of water-repellency from the plumage following cleaning, and so far no cleaning method is generally accepted as overcoming this problem. It is unlikely that the characteristic rapid wetting of plumage in birds cleaned by the majority of methods is caused by surface contamination of the feathers, giving a wettable, porous structure. Hydrocarbon solvents used to clean single oiled feathers do not cause water-wetting, and evaporate completely leaving the feather surface free from residues. Cost, volatility and the toxicity of such solvents have previously led to their being considered impractical as agents to be used for cleaning birds, but low toxicity Arklone P (ICI Ltd.) has been used in a preliminary trial. Immersion in Arklone P, followed by drying with a warm air blower in a well ventilated room resulted in a plumage that was watertight, and a cleaned bird was able to swim on the day it was cleaned without penetration of water into the plumage. While cleaning with solvents is not practical under field conditions, this trial was useful in showing that oiled birds need not necessarily wet after cleaning. (Svensson-Washington)
W73-00001

MICROBIAL CRITERIA OF ENVIRONMENT QUALITIES,
Copenhagen Univ. (Denmark). Inst. of Hygiene.
E. Fjerdingstad.
Annual Review of Microbiology, Vol. 25, p 563-582, 1971. 3 tab, 58 ref.

Descriptors: *Eutrophication, *Biological properties, *Water quality, *Bioindicators, *Biological communities, Aquatic algae, Aquatic productivity, Biochemical oxygen demand, Lake stages, Nutrients, Mestrophy, Oligotrophy, Oxygen sag, Aquatic life, Bioassay, Classification.
Identifiers: Biotests.

After a brief discussion of eutrophication and a survey of biotests, biological assessment of eutrophication and pollution is discussed. A number of classification systems for denoting the degree to which water is polluted, some defined in terms of biological populations, are given. The system most discussed relates saprobicity level and structures of the communities of organisms. (Svensson-Washington)
W73-00002

THE COMPARATIVE SENSITIVITY OF COARSE FISH AND TROUT TO POLLUTION,
Water Pollution Research Lab., Stevenage (England).
J. S. Alabaster.
In: Proceedings of the Fourth British Coarse Fish Conference, Liverpool University, March 27-29, 1969. 6 p, 4 fig, 15 ref.

Descriptors: *Routh fish, *Water pollution effects, *Trout, *Fish physiology, Rainbow trout, Bioassay, Environmental effects, Water properties, Toxicity, Salinity, Water temperature, Dissolved oxygen, Hydrogen ion concentration, Sewage effluents, Industrial wastes.
Identifiers: *Comparative sensitivity, Salmo spp.

There is already sufficient information from laboratory and field observations to conclude that coarse fish are generally somewhat less sensitive to pollution than trout, though differences between species are not always the same for all poisons or conditions. Therefore, apart from the need for more work on trout to enable better predictions of the toxicity of sewage effluents or rivers containing industrial wastes, knowledge of the sensitivities of coarse fish needs to be extended and should include information on the effects of mixtures of poisons so that special attention can be given to these fish when necessary. Where predictions of toxicity cannot be made for lack of chemical analyses, and, as an alternative, a direct measurement of toxicity is made using a sensitive species like the trout, the relationship between the sensitivity of trout and that of the coarse fish species concerned also has to be established. (Svensson-Washington)
W73-00003

POLYCHLORINATED BIPHENYLS (PCB): EFFECT ON MITOCHONDRIAL ENZYME SYSTEMS,
Nevada Univ., Reno. Div. of Biochemistry.
R. S. Pardini.
Bulletin of Environamental Contamination and Toxicology, Vol. 6, No. 6, p 539-545, 1971. 3 tab, 18 ref.

Descriptors: *Polychlorinated biphenyls, *Aroclors, *Enzymes, *Inhibitors, Pesticide residues, Toxicity, Biochemistry, Bioassay, Water pollution effects.
Identifiers: *Mitochondrial enzyme systems, NADH-oxidase, Succin-oxidase.

Recent reports that DDT and other chlorinated insecticides inhibit mitochondrial electron transport systems provided the incentive for investigating the effects of the PCBs on mitochondrial NADH-oxidase and succin-oxidase systems. All of the PCBs tested inhibited both systems, since they all depressed enzyme activity to below 20% of the uninhibited controls. These findings suggest that at the concentrations employed, the degree of chlorination of PCB material between the range of 21-62% is of minor structural significance in relation to electron transport inhibition. These data, however, do not permit a strict comparison of potency between the various PCB samples. Although the physiological significance of these in vitro studies remains to be established in vivo, these data further demonstrate the toxic nature of the PCBs. (Svensson-Washington)
W73-00004

THE INFLUENCE OF TEMPERATURE CHANGES ON ENZYMES OF THE FISH MUSCLE. EXPERIMENTS WITH RHODEUS AMARUS. (DER EINFLUSS VON TEMPERATURANDERUNGEN AUF ENZYME DER FISCHMUSKULATUR. VERSUCHE MIT RHODEUS AMARUS),
Kiel Univ. (West Germany).
K. Braun, H. Kunnemann, and H. Laudien.
Marine Biology, Vol. 7, No. 1, p 59-70, September 1970. 5 fig, 6 tab, 38 ref. (English summary).

Descriptors: *Fish physiology, *Enzymes, *Water temperature, *Oxygen requirements, Biochemistry, Adaptation, Environmental effects, Seasonal, Heat resistance, Bioassay, Stress.
Identifiers: Rhodeus spp., Enzyme activity.

The enzyme activities estimated in the muscles of Rhodeus amarus may vary according to the kind of muscle, age and sex of the test individuals, as well as with the time of day, and the season. Oxygen consumption of individuals acclimated to different temperatures was tested at 22 C. At low adaptation temperatures no adaptation was found; at high adaptation temperatures, however, compensation could be ascertained. In view of the considerable fluctuation of the enzyme activities, estimated from individuals adapted to different temperatures, a relation to certain adaptation types is hardly possible. During the first days following sudden or slow changes of adaptation temperature (increase or decrease) more or less marked fluctuations of enzyme activities were found. Later, however, in accordance with the proceeding adaptation, a new, labile balance was established. Temperature changes represent a physiological stress even within normal temperature ranges. This fact requires general attention in studies on biological processes. Disturbance of a newly established balance of enzyme activities can be obtained when test fishes are exposed to high temperatures. This finding may be of importance in regard to the heat resistance of the animals. (Svensson-Washington)
W73-00005

THE INFLUENCE OF TEMPERATURE CHANGES ON ENZYMES OF FISH MUSCLES. EXPERIMENTS WITH GOLDEN ORFS IDUS IDUS. (DER EINFLUSS VON TEMPERATURANDERUNGEN AUF ENZYME DER FISCHMUSKULATUR. VERSUCHE MIT GOLDORFEN IDUS IDUS),
Kiel Univ. (West Germany).
H. Kunnemann, H. Laudien, and H. Precht.
Marine Biology, Vol. 7, No. 1, p 71-81, September 1970. 6 fig, 1 tab, 28 ref. (English summary).

Descriptors: *Fish physiology, *Enzymes, *Water temperature, Biochemistry, Adaptation, Environmental effects, Seasonal, Bioassay, *Respiration.
Identifiers: *Golden orfs, Orfs, Enzyme activity, *Succinate respiration, Idus spp.

Succinate respiration and various enzyme activities were measured in the white dorsal muscles of golden orfs adapted to different temperatures. In adaptation experiments, attention must be paid to diurnal fluctuations in enzyme activity. Season can also influence the level of enzyme activity, possibly through changes in day length. Succinate respiration of golden orfs adapted to 5 C is about 10% higher than in individuals adapted to 20 C (experimental temperature 25 C). Following reverse adaptation from 20 C to 5 C (at the rate of 5 C/hr), the values approach, after fluctuations, those of 5 C individuals. After raising or lowering the adaptation temperature at the rate of 5 or 2 C/hr, fluctuations in several enzymes appeared initially. Changes in temperature cause a limited phase of

increased functional lability. (Svensson-Washington)
W73-00006

THE INFLUENCE OF SYNTHETIC SURFACTANTS ON THE FUNCTIONAL PROPERTIES OF THE OLFACTORY EPITHELIUM OF ATLANTIC SALMON,
Fisheries Research Board of Canada St. Andrews (New Brunswick). Biological Station.
A. Sutterlin, N. Sutterlin, and S. Rand.
Technical Report No. 287, 1971. 14 p, 2 fig, 1 tab, 15 ref.

Descriptors: *Surfactants, *Atlantic salmon, Water pollution effects, Alkylbenzene sulfonates, Ammonium salts, Detergents, Linear alkylate sulfonates.
Identifiers: *Olfactory epithelium, *Chemosensitivity, Imidazolinium salts, Diamines, Sensory blocking, Sensory stimulation.

Over 150 synthetic surfactants were tested for stimulatory effectiveness and possible blocking effects on the sensory discharge evoked by amino acids in the olfactory epithelium of Atlantic salmon parr. Few surfactants were stimulatory at 1 and 10 mg/l and no trends were apparent relating stimulatory effectiveness to certain classes of these compounds. Blocking effects at 1 mg/l and lower were observed for several alkylbenzenesulfonates, quaternary ammonium and imidazolinium salts and diamines. Most blocking effects were reversible following rinsing with clean water. Nonionic surfactants exhibited no blocking effects. (Svensson-Washington)
W73-00007

DDT RESIDUES IN EGGS OF MARSH-INHABITING BIRDS,
New York State Dept. of Environmental Conservation, Albany.
For primary bibliographic entry see Field 05A.
W73-00009

CHLORINE TOLERANCE OF THE COLONIAL HYDROID BIMERIA FRANCISCANA,
Academy of Natural Sciences of Philadelphia, Pa.; and Benedict Estuarine Lab., Md.
R. I. McLean.
Chesapeake Science, Vol. 13, No. 3, p 229-230, September 1972. 2 fig, 2 ref.

Descriptors: *Chlorine, *Bioassay, *Water pollution effects, *Chlorination, *Water treatment, Fouling, Animal growth, Growth rates, Growth stages, Mortality, Brackish water.
Identifiers: *Hydroides, Bimeria spp., Euryhaline.

The euryhaline colonial hydroid Bimeria franciscana was experimentally exposed to various concentrations of chlorine to determine the effect of power plant chlorination on growth. Colonies attached to suspended nylon lines were exposed to 0.0, 1.0, 1.5, 2.5, 3.5, and 4.5 mg/l total chlorine for one hour and three hours, and returned to their natural habitat. Growth occurred in all colonies and was slightly inhibited in colonies exposed to the higher chlorine concentrations. (Svensson-Washington)
W73-00011

THERMAL POLLUTION AND THE POWER INDUSTRY,
Potomac Electric Power Co., Washington, D. C.
L. W. Cadwallader.
In: Proceedings of the American Power Conference, Symposium on Air and Water Pollution, Vol 30, p 113-117, 1968.

Descriptors: *Thermal powerplants, *Cooling, *Heated water, *Sites, Rivers, District of Columbia, Economics, Planning, *Thermal pollution, Nuclear powerplants, Outlets, Model studies, Temperature, Cost analysis.
Identifiers: *Temperature effects, *Site selection, Impact area.

The Potomac Electric Power Company has two steam-electric generating stations actually in operation which were designed and constructed to produce the least possible effect on the rivers from which they obtain their cooling water supplies. The experience gained during operation of the Dickerson Generating Station on the Potomac River and Chalk Point Station on the Patuxent River is discussed. The application of modern tools to management, planning, research and development is described in the example of Pepco's third powerplant, built with the greatest care to evaluate the thermal effects of a proposed new generating facility. Advantages and disadvantages of cooling towers are briefly summarized. (Oleszkiewicz-Vanderbilt)
W73-00067

THE EFFECT OF THE POWER PLANT THERMAL LOAD ON THE BAY OF NAANTALI,
Imatran Voima Osakeyhtio, Helsinki (Finland). Nuclear Power Project Group.
Y. S. El Mahgary.
In: International Association for Hydraulic Research, 1971. p 342-348, 12 fig, 3 tab, 4 ref.

Descriptors: *Thermal powerplants, *Environmental effects, *Thermal pollution, Water pollution, Heat transfer, Mixing, Cooling, Powerplants, Outlets, Meteorological data, Physicochemical properties, Water temperature, Temperature.
Identifiers: *Thermal load, *Naantali Bay (Finland), Thermal effects.

Field measurements were carried out to determine the effect of discharging the warm cooling water of the Naantali Power Plant (Finland) on the physical and chemical properties of the water in the bay of Naantali. Surveys of water temperature in the bay of Naantali and measurements of the physicochemical properties of the water at the plant inlet and outlet were carried out four times throughout the year. Meteorological information was also recorded at the same time as the measurements were performed. The results have shown that a sharp drop in the outlet temperature has taken place within a few meters from the outlet, and that the physicochemical properties of the water in the bay were subjected to insignificant or no changes. (Oleszkiewicz-Vanderbilt)
W73-00072

STUDY OF EFFLUENTS FROM LARGE POWER PLANTS,
Environmental Protection Agency, Raleigh, N. C. Div. of Meteorology.
For primary bibliographic entry see Field 05A.
W73-00075

PLANTS SHOW PROGRESS IN POLLUTION CONTROL,
For primary bibliographic entry see Field 05D.
W73-00077

CONSEQUENCES OF ARTIFICIAL INCREASE IN TEMPERATURE OF SURFACE WATER IN RELATION TO WATER SUPPLY,
Stadtwerke Wiesbaden A.G. (West Germany). Laboratoriem.
K. Haberer.
In: Ninth International Water Supply Congress and Exhibition, New York, September 11-14, 1972, International Water Supply Association, London, p N10-N13, 1972, 3 fig, 24 ref.

Descriptors: *Temperature, *Heated water, *Water quality, *Physicochemical properties, Thermal pollution, Water treatment, Water quality control, Rivers, Lakes, Ground water, Water distribution (Applied), Standards, Self-purification, Eutrophication, Aquatic life, Water chemistry, Water pollution.
Identifiers: *Temperature increase, *Thermal effects, *Temperature criteria, *Rhine River, Temperature standards.

Thermal pollution problems that are especially emphasized include the following: the depletion of oxygen by increased rate of self-purification in water courses; the metabolites and degradation products following mass production of micro-organisms in storage reservoirs; the reactions comprising solution and precipitation in the subsoil in infiltration areas; the acceleration of processes and the higher chemical consumption which is needed in order to eliminate deterioration in (raw-) water quality in water treatment plants; the increased rate of corrosion reactions as well as bacteriological, taste, and odor problems in distribution systems. To eliminate the consequences - predominantly detrimental - of artificial increases of temperature, higher demands will need to be met in regard to the technical and economic aspects of water treatment and the maintenance of supplies. (Oleszkiewicz-Vanderbilt)
W73-00087

IMPACT OF DROUGHT ON NEW JERSEY'S WATER RESOURCES,
Geological Survey, Trenton, N.J.
For primary bibliographic entry see Field 06G.
W73-00135

THE DESIGN OF THE MONITORING SYSTEM FOR THE THERMAL EFFECT STUDY OF THE SURRY NUCLEAR POWER PLANT ON THE JAMES RIVER,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 05B.
W73-00208

THERMAL EFFECTS OF PROJECTED POWER GROWTH: LOWER MISSISSIPPI RIVER BASIN,
Hanford Engineering Development Lab. Richland, Wash.
D. E. Peterson, and P. M. Schrotke.
Report HEDL-TME 72-69, April 1972. 113 p, 34 fig, 2 tab, 31 ref. AEC at945-1)-2170.

Descriptors: *Water pollution effects, *Forecasting, *Thermal powerplants, Cooling, Planning, Management, Powerplants, *Thermal pollution, Water pollution, *Mississippi River.
Identifiers: *Thermal effects, Thermal load, Heat assimilative capacity, Heat dissipative capacity, Once-through cooling, Energy, Power generation.

Direct cooling capacities of the Lower Mississippi River and six tributaries, excluding the Missouri and Ohio Rivers, were calculated for average and low flow conditions. Total assimilative and dissipative capacity for the section extending from Alton, Illinois to the mouth (1156 river miles) ranged from a high of 464 GWT to a low of 137 GWT. At the 1969 average once-trhough thermal rejection ratio of about 1.6 (MWT/MWe) for the Lower Mississippi Basin, the upper limit for direct cooled electrical generation would be 86 GWe on the main stem at a 100% capacity factor and under low monthly conditions. Analyses of projected power generation patterns indicate that the Mississippi River has adequate heat sink capacity for once-through cooling requirements through 1990. Regional planning of thermal discharge sites will be most important in the St. Louis area. Larger tributaries such as the Yazoo, Arkansas and Red Rivers are affected by low flow conditions to an extent that closed cycle cooling would be expected in the middle and upper reaches for steam plants in the 500 MWe class and variable cycle or closed cycle in the lower sections. (Oleszkiewicz-Vanderbilt)

W73-00211

PRIMARY PRODUCTION AND RESPIRATION OF THE PHYTOPLANKTON OF THE RIVERS THAMES AND KENNET AT READING,
Reading Univ. (England). Dept. of Zoology.
A. Kowalczewski, and T. J. Lack.
Freshwater Biology, Vol 1, p 197-212, 1971. 8 fig, 5 tab, 28 ref.

Descriptors: *Rivers, *Primary productivity, Respiration, Phytoplankton, Chlorophyll, Pigments, Streams, Organic matter, Solar radiation, Euphotic zone.
Identifiers: *River Thames (England), *River Kennet (England), *Reading (England).

The first available data on phytoplankton production for a British river was obtained during April 1967-April 1968 when it was measured in the River Thames and its tributary, River Kennet by the light and dark bottle technique. When the bottles were rotated, production and respiration values were higher than in stationary bottles. Chlorophyll peaks were found in spring, summer and autumn in the Thames, but little variation occurred in the Kennet. Pheopigment concentration was low in both rivers, although in the Kennet this represented 50% of the pigments present. In the Thames a peak of pheopigments was associated with the autumnal bloom and represented 61% of total pigments. In the Thames over 25% of the average concentration of suspended organic matter was due to phytoplankton and in the Kennet almost 95% was non-algal. Net oxygen production in the Thames reached a peak in May and was negative from November to February. In the Kennet, maximum production also occurred in May, but was negative from mid-May until the following March. Respiration rates showed similar fluctuations. Net production in the Thames could be explained as a function of solar radiation, chlorophyll concentration, and euphotic depth. (Jones-Wisconsin)
W73-00231

USE OF TESTS FOR LIMITING OR SURPLUS NUTRIENTS TO EVALUATE SOURCES OF NITROGEN AND PHOSPHORUS FOR ALGAE AND AQUATIC WEEDS,
Wisconsin Univ., Madison. Water Chemistry Lab.
G. P. Fitzgerald, and G. F. Lee.
Report July 1, 1971. 35 p, 4 fig, 3 tab, 23 ref.

Descriptors: *Algae, *Aquatic weeds, *Nutrients, Bioassay, Limiting factors, Nitrogen, Phosphorus, Rain, Lakes, Cladophora, Analysis, Phytoplankton, Chemical analysis, Diatoms, Cyanophyta, Turnovers, Eutrophication.
Identifiers: Lake Mendota (Wis.), Lake Monona (Wis.), Lake Wingra (Wis.), Limiting nutrients, Surplus nutrients, Nutrient sources.

Sources of nitrogen and phosphorus available to algae and aquatic weeds and their nutritional status were determined by a simple bioassay procedure. The algae and aquatic weeds were collected from Lake Mendota's south shore, the west bay of Lake Monona, or from Lake Wingra, all in Madison, Wisconsin within about one mile of each other, although varying widely. Rain could be the major source of available nitrogen to Cladophora in Lake Mendota during summer; increases in phosphorus associated with rainfalls were detected but were not as dramatic as nitrogen increases. Mixed blooms of planktonic algae do not share their nutrients with other algae even when one species may have a surplus and another is nutrient-limited. In comparing surface and subsurface phytoplankton, at certain times surface plankton can be nutrient limited while the same species from subsurface sources has adequate or surplus nutrients. Fall overturn as a nutrient source demonstrates how similar changes can take place in the nutrition of different algal types. For accurate evaluation of the nutrient level of lakes, bioassays of surface waters should be contrasted with analyses of waters from the thermocline or hypolimnion and with waters obtained in the spring before maximum plant production. (Auen-Wisconsin)
W73-00232

EFFECTS OF THERMAL ADDITIONS FROM THE YELLOWSTONE GEYSER BASINS ON THE BACTERIOLOGY OF THE FIREHOLE RIVER,
Indiana Univ., Indianapolis. Dept. of Microbiology.
J. Zeikus, and T. D. Brock.
Ecology, Vol 53, No 2, p 283-290, 1972. 5 fig, 2 tab, 22 ref.

Descriptors: *Thermal pollution, *Thermal water, *Geysers, *Bacteria, Rivers, Wyoming, Temperature, Hydrogen ion concentration, Alkalinity, Conductivity, Phosphates, Heated water, Thermophilic bacteria, Indicators.
Identifiers: *Yellowstone Park (Wyo.), *Firehole River (Wyo.).

The Firehole River where it flows through the main geyser basins of Yellowstone Park was studied and is considered as a model for thermal pollution effects. Temperature, pH, alkalinity, conductivity, and phosphate were measured. The growth rates of periphytic bacteria, measured in situ on glass slides, were virtually identical at different stations despite the wide temperature differences. Temperature optimum for incorporation of C-14 glucose by benthic bacterial populations increased in parallel with the temperature of the habitat. Bacteria are near-optimally adapted to the temperature of their habitat and despite wide differences in temperature the rate of bacterial activity is the same. The number of bacteria able to grow at temperatures of 25C, 55C, and 70C were estimated in a study of water samples placed on agar media and incubated. Bacillus stearothermophilus primarily developed at 55C and Thermus aquaticus at 70C. Thermophiles were not present in water which had not received thermal additions. Both kinds of thermophiles were found in warm water, numbers increasing progressively as more thermal water entered. Downstream from the thermally heated region, thermophilic bacteria numbers decreased markedly. Thermophilic bacteria as indicators of thermal pollution is discussed. (Jones-Wisconsin)
W73-00233

THE IMPORTANCE OF ALGAL CULTURES FOR THE ASSESSMENT OF THE EUTROPHICATION OF THE OSLOFJORD,
Norwegian Inst. for Water Research, Oslo.
O. M. Skulberg.
Helgolander wissenschaftliche Meeresuntersuchungen, Vol 20, p 111-125, 1970. 10 fig, 3 tab, 30 ref.

Descriptors: *Algae, *Cultures, *Indicators, *Eutrophication, Fjords, Bioassay, Chlorella, Nutrients, Water sampling, Organic matter, Water pollution effects, Sewage, Nitrogen, Phosphorus, Iron, Phytoplankton, Diatoms, Dinoflagellates.
Identifiers: *Oslofjord (Norway).

The relative significance in eutrophication of the different contributing waters of the Oslofjord sea water, runoff water from catchment areas, bottom waters of the fjord, and sewage, and other polluting matter of urban origin, are evaluated by applying algal culture assays. In 1962 to 1965 unialgal cultures of test algae, including Selenastrum capricornutum, Chlorella ovalis, Skeletonema costatum, and Phaeodactylum tricornutum were used for bioassays. The amounts and availability of plant nutrients in the water are thus measured and the quality of the water for algal growth determined. The results indicated that the water of the inner part of the fjord was in a condition where a significant increase in sewage load gave a relatively small increase in algal growth. Conversely, in water samples from the outer Oslofjord, a small addition of sewage would give relatively high increase in growth. It was shown, in enrichment experiments with essential nutrients, that the supply of compounds of nitrogen, phosphorus, and iron was important for the resulting yield of algae. The main fertilizing effect could not be ascribed to any single component. (Jones-Wisconsin)
W73-00234

REVIEW OF STUDIES ON FEEDING OF AQUATIC INVERTEBRATES CONDUCTED AT THE INSTITUTE OF BIOLOGY OF INLAND WATERS, ACADEMY OF SCIENCE, USSR,
Akademiya Nauk SSSR, Yaroslavl. Institut Biologii Vnutrennykh Vod.
A. V. Monakov.
Journal Fisheries Research Board of Canada, Vol 29, No 4, p 363-383, 1972. 16 fig, 20 tab, 81 ref.

Descriptors: *Food, *Aquatic animals, *Invertebrates, Rotifers, Oligochaetes, Crustaceans, Copepods, Larvae, Omnivores, Gastropods, Tubificids, Mollusks, Scenedesmus, Chlorella, Bacteria, Daphnia, Insects, Food webs, Diptera.
Identifiers: *Feeding methods, Food assimilation, Food consumption, Borok Institute (USSR).

Food, methods of feeding by various invertebrates (Crustacea, Mollusca, Protozoa, and Oligochaeta), daily food consumption and food assimilation have been studied in nature and in laboratories for 10 years at the Borok Institute (USSR). Four feeding methods (filtration, scraping from the surface substratum, predation, and mixed) have been recorded. Each method may be specific to a species, a whole family or order; even similar species may differ widely in mechanisms and feeding characteristics; the usual accordance of feeding methods with mouth structure is not observed in some cases. Most invertebrates are omnivores although some live on only one type of food. Daily food consumption changes withfood concentration, temperature, and size of consumer. At 15-22C and a nearly optimum concentration of food mean daily ratios of most invertbrates studied usually range from 25 to 100% wet body weight. Only in pulmonary Gastropoda and silt-eating Tubificidae does it greatly exceed body weight. For most invertebrates feeding on natural food at optimum concentrations, index of assimilation varies widely but rarely exceeds 50%. In most species investigated, the assimilability of plant food was 45-55% and appears considerably higher when animal food is used. (Jones-Wisconsin)
W73-00235

ECOLOGICAL STUDIES ON DISSOLVED OXYGEN AND BLOOM OF MICROCYSTIS IN LAKE SUWA--I. HORIZONTAL DISTRIBUTION OF DISSOLVED OXYGEN IN RELATION TO DRIFTING OF MICROCYSTIS BY WIND,
Shinshu Univ., Suwa (Japan). Suwa Hydrobiological Station.
H. Yamagishi, and K. Aoyama.
Bulletin of the Japanese Society of Scientific Fisheries, Vol 38, No 1, p 9-16, 1972. 6 fig, 1 tab, 7 ref.

Descriptors: *Cyanophyta, *Dissolved oxygen, *Eutrophication, *Distribution, Floating, Winds, Algae, Surface waters, Hydrogen ion concentration, Light penetration, Photosynthesis, Phytoplankton, Stratification, Diatoms, Currents (Water), Fish farming.
Identifiers: *Microcystis, *Lake Suwa (Japan).

The severe water-bloom of blue-green algae dominated by Microcystis appears almost every summer and summer kill often attacks the carp cultured in floating nets. Observations were made on horizontal distribution of dissolved oxygen in the surface water across Lake Suwa, Japan in rela-

tion to wind induced drift of Microcystis. Temperature, pH, and cell number of Microcystis in the surface water together with transparency and wind direction were recorded. The studies demonstrated that dissolved oxygen in the lake increased from the windward to the leeward with concomitant increases in the density of drifting Microcystis and pH values. Oxygen was markedly undersaturated on the windward (less than 50% saturation), but extremely supersaturated on the leeward (more than 250% saturation). Cell numbers of Microcystis reached 28 million/ml at areas of highest density. Laboratory tests and in situ observations indicate that a very thick layer of Microcystis in the topmost water of the lake inhibit photosynthesis of underlying algae by shading but the reason for the constant pH value before and after illumination remained unknown. (Jones-Wisconsin)
W73-00236

A YEARS' STUDY OF THE DRIFTING ORGANISMS IN A BROWN-WATER STREAM OF ALBERTA, CANADA,
Alberta Univ., Edmonton. Dept. of Zoology.
H. F. Clifford.
Canadian Journal of Zoology, Vol 50, p 975-983, 1972. 4 fig, 5 tab, 12 ref.

Descriptors: *Streams, *Aquatic animals, Crustaceans, Flow nets, Biomass, Density, Insects, Seasonal, Limnology, Marshes, Zooplankton.
Identifiers: *Alberta (Canada), *Brown water, Drifting biota, Entomostracans.

In an investigation of a brown-water stream in west-central Alberta, Canada the drifting animals were studied for a 1-year period to describe more fully the general limnological features. Magnitude of the drift and the various diel and seasonal patterns of stream organisms in the drift were studied. Ten 24-hour drift samples were taken with drift nets. They were largely Cladocerans, cyclopoids, and ostracods, collectively called entomostracans. Drift densities of entomostracans tended to increase as the ice-free season progressed, but drift densities of immature insects remained relatively constant throughout the ice-free season. Total daily drift of both entomostracans and non-entomostracan fractions tended to decrease as the ice-free season progressed, being dependent on water volume. Drift densities, total daily drift, and number of taxa in the drift were very low in winter. At the sampling site, the entomostracans and immature aquatic insects were essentially evenly distributed throughout the water column. When compared with other regional drift studies, the large fraction of entomostracans in the brown-water stream seems to be a unique feature. There is evidence that most of the drifting entomostracans originate in the marshy area drained by the main stream. (Jones-Wisconsin)
W73-00237

ALGAE AS INDICATORS OF PESTICIDE,
State Univ., Coll., Buffalo, N.Y. Great Lakes Lab.
R. A. Sweeney.
Special Report No. 4, February 1970. 10 p. 1 fig, 28 ref. (Presented at 'Algae As Indications' Symposium of the Phycological Society of America, September 4, 1968, Ohio State University, Columbus).

Descriptors: *Algae, *Indicators, *Pesticides, Chlorinated hydrocarbon pesticides, Insecticides, Rodenticides, Herbicides, Fungicides, Algicides, Carbamate pesticides, Organophosphorus pesticides, Acaricides, Food chains, Water pollution sources.

The nature and exteat of pesticide contamination of aquatic habitats in the United States are reviewed. A routine sampling program for pesticides has been initiated at approximately 100 surveillance stations on the major river basins within the United States. This is conducted through coordinated and cooperative efforts of federal, state, local, and private agencies. Special attention has been given to aldrin, benzene hexachloride, dieldrin, endrin, heptachlor, heptachlor epoxide, toxaphene, and DDT and its derivatives--DDE and DDD, all characterized by long residual action. Since algae rapidly accumulate numerous pesticides and comprise the base of most aquatic trophic pyramids, the routine collection and analysis of algae should be part of our nationwide monitoring system and should enlist the assistance of algal taxonomists. This would give a more meaningful indication of the threat of pesticide contamination of the higher aquatic organisms and man. Biological determinations of pesticide uptake are necessary as a check because chemical analyses, using thin layer and gas chromatography, are not always reliable. Algae which accumulate pesticides can be employed in the collection, identification, and quantification of pesticides. (Jones-Wisconsin)
W73-00238

STUDIES ON DENITRIFICATION IN A BRACKISH LAKE,
Tokyo Univ. (Japan). Ocean Research Inst.
I. Koike, E. Wada, T. Tsuji, and A. Hattori.
Archiv fur Hydrobiologie, Vol 69, No 4, p 508-520, 1972. 7 fig, 3 tab, 25 ref.

Descriptors: *Denitrification, *Brackish water, *Lakes, Nitrites, Nitrates, Biochemistry, Anaerobic conditions, Bacteria, Dissolved oxygen, Pseudomonas, Ammonia.
Identifiers: *Denitrifying bacteria, Lake Hamana (Japan), Pseudomonas denitrificans, Alcaligenes, Micrococcus denitrificans.

For further insight into the ecological aspects of denitrification in aquatic systems, especially as to the function of denitrifying bacteria, data were obtained in Lake Hamana, Japan during two years. This shallow brackish lake is high eutrophic, opening to the Pacific Ocean. Denitrification activity was determined by a N-15 technique. The lake structure and climatic conditions bring about alternative anoxic and oxic environments in the bottom layer during the year. The denitrifying bacteria were almost uniformly distributed at all depths, irrespective of the time of year and constitute 0.1 to 1% of the total heterotrophic bacterial population. No positive correlation was observed between denitrifying bacteria numbers and denitrification activities. Denitrification activity was suppressed to a considerable extent by the presence of oxygen, as expected from the facultatively anaerobic nature of denitrifying bacteria. The occurrence of denitrification in the water was restricted in oxygen-deficient deeper layers from May through September. The denitrification rate would be dually controlled by nitrate: directly as a rate-limiting factor of the bacterial denitrification reaction and indirectly as a factor controlling the enzyme level of the denitrification system in denitrifying bacteria. (Jones-Wisconsin)
W73-00241

THE EFFECTS OF INCREASING LIGHT AND TEMPERATURE ON THE STRUCTURE OF DIATOM COMMUNITIES,
Academy of Natural Sciences of Philadelphia, Pa. Dept. of Limnology.
R. Patrick.
Limnology and Oceanography, Vol 16, No 2, p 405-421, March 1971. 1 fig, 4 tab, 17 ref.

Descriptors: *Light, *Temperature, *Diatoms, Biological communities, Systematics, Cyanophyta, Chemical analysis, Seasonal, Biomass, On-site investigations, Algae.
Identifiers: Gomphonema olivaceoides, White Clay Creek (Pa.).

The differences in temperature or light requirements, or both, apparently influence seasonal succession of species. The problem arises whether raising the temperature a few degrees near the ends of their range of tolerance has a greater effect on diatom communities than raising the temperature above ambient in the middle portion of the tolerance range. Effects on community structure of various day lengths and of artificial temperature increase compared with natural temperature increase were studied. Summary of chemical analysis of the stream, the characteristics of the diatom communities and the percentage occurrence of the more common species are tabulated. Naturally increasing day length was more favorable for community development than increasing day length by artificial light. Increasing temperature is most beneficial when temperatures are near OC. Moving away from the tolerance limits at either end of the range produced the greatest changes in diatom community structure. Intermediate changes near the optimum range produced less predictable results. One new taxon named Gomphonema olivaceoides var. hutchinsoniana var. nov., is described. (Jones-Wisconsin)
W73-00242

COMPARATIVE STUDIES ON ALGAL TOXINS,
New Hampshire Univ., Durham. Dept. of Zoology; and New Hampshire Univ., Durham. Jackson Estuarine Lab.
J. J. Sasner, Jr.
(1971), 98 p. 13 fig., 3 tab., 121 ref. OWRR A-021-NH (1) and A-013-NH (4).

Descriptors: *Analytical techniques, *Algal toxins, Aquatic plants, Toxins, Red tide, Plant physic[illegible] ay, Bioassay, Cytological studies, Dinoflagellates, Cyanophyta.
Identifiers: *Toxicology, Biotoxins, Pharmacology.

Changes were developed in the theories concerning the ionic basis of cell electrogenesis and junctional transmission between cells which toxicologists have used to study sites and modes of action of aquatic poisons. The comparative physiologist may find biotoxins useful in determining similarities and differences in electrogenic and transmitter mechanisms in a wide variety of organic systems. Tetrodotoxin has already received wide usage in blocking Na+ conductance across nerve and muscle membranes; the effect of this toxin is more specific than procaine and other anaesthetics which also affect K+ conductance. To determine whether dinoflagellate toxins that cause general membrane depolirization produce their effects by altering membrane permeability or by inactivating the ionic pump active transport mechanism and whether depolarizing toxins can act as metabolic poisons, or can proven depolarizing effects be antagonized by tetrodotoxin saxitoxin or their analogues which bloc ionic channels will be of interest. The apparent immunity to potent biotoxins of transvectors who apparently act as 'biological storage depots' for organisms higher in the food chain is of equal interest. It is clear the flagellate and blue-green algal toxins affect ionic mechanisms of electrogenesis associated with the membrane and the transmitter system exerting chemical control between contiguous cells. (Auen-Wisconsin)
W73-00243

NEW APPROACHES FOR POLLUTION CONTROL,
Pennsylvania State Univ., University Park. Dept. of Soil Physics.
For primary bibliographic entry see Field 05G.
W73-00244

ACTION SPECTRA FOR ULTRAVIOLET KILLING AND PHOTOREACTIVATION IN

THE BLUE-GREEN ALGA AGMENELLUM QUADRUPLICATUM,
Texas Univ., Port Aransas. Inst. of Marine Sciences.
C. Van Baalen, and R. O'Donnell.
Photochemistry and Photobiology, Vol 15, p 269-274, 1972. 4 fig, 14 ref.

Descriptors: *Photosynthesis, *Ultraviolet radiation, *Photoactivation, Cyanophyta, Pigments, Plant physiology.
Identifiers: Ultraviolet killing, Agmenellum quadruplicatum, Carotenoids, DNA.

Using liquid growth conditions and medium, as previously reported, suspensions for ultraviolet killing experiments or photoreactivation of the coccoid blue-green alga, Agmenellum quadruplicatum, Strain PR-6 were made by centrifuging, washing, and resuspending in the growth medium from which vitamin B-12 and the nitrogen source were omitted. Action spectra for photoreactivation and ultraviolet killing are presented. The spectrum is rather similar to that recorded for Streptomyces griseus conidia, with some suggestion of a little more structure. The action spectrum suggests possible carotenoid involvement; no other evidence for this could be found. The action spectrum for u.v. killing is also broad with some evidence of fine structure. The possible implication of tetrahydropteridines or c-phycocyanin as chromophores in the region 240-300 nm, along with DNA, is shown. As in other photoreactivations, this action spectrum only broadly delimits, but does not clearly define what the chromophore might be. With cells of PR-6 grown in inhibitory concentrations of diphenylamine, which lowered colored carotenoids, there was no effect on u.v. sensitivity or subsequent photoreactivation. Likewise, extraction and chromatography did not reveal detectable difference in carotenoids, either after u.v. exposure or during photoreactivation. (Jones-Wisconsin)
W73-00245

APHANIZOMENON FLOS-AQUAE: INFECTION BY CYANOPHAGES,
Lantbrukhogskolan, Uppsala (Sweden). Dept. of Microbiology.
U. Granhall.
Physiologia Plantarum, Vol 26, p 332-337, 1972. 9 fig, 18 ref.

Descriptors: *Algal control, *Infection, *Viruses, Cyanophyta.
Identifiers: *Cyanophages, *Aphanizomenon flos-aquae, Lake Erken (Sweden).

Nitrogen-fixing blue-green algae were studied in Lake Erken, Sweden during the summer of 1970. A lytic agent was present in Lake Erken and electron micrographs of algal samples showed that cyanophage-like particles occurred in large numbers, specifically associated with vegetative cells of Aphanizomenon flos-aquae. Electron microscopy, sterile filtrations (including steps to exclude bacteria) and plaque techniques were used to correlate the virus fluctuations with the water-bloom and degradation of Aphanizomenon. Only vegetative cells of Aphanizomenon were lysed, not heterocysts and akinetes. Infected cells of Aphanizomenon and extracellular virions could not be detected by electron microscopy in lake samples until the late stage of the water-bloom; the host showed normal ultrastructure up to the period of most extensive water-bloom. Algal samples, taken some weeks later showed quite different ultrastructures due to cell infection by virus particles. It is suggested that a cyanophage named Ap-1 regulates termination of the A. flos-aquae bloom. If the isolated viruses could be used in environmental control after propagation in the laboratory it would constitute a new approach in controlling Aphanizomenon blooms. (Jones-Wisconsin)
W73-00246

SENSITIVITY TO STIMULATION, A COMPONENT OF THE CIRCADIAN RHYTHM IN LUMINESCENCE IN GONYAULAX,
California Univ., Santa Barbara. Dept. of Biological Sciences.
R. Christianson, and B. M. Sweeney.
Plant Physiology, Vol 49, p 994-997, 1972. 4 fig, 1 tab, 11 ref.

Descriptors: *Bioluminescence, *Dinoflagellates, *Biorthyms, Plant physiology.
Identifiers: *Stimulation, *Gonyaulax polyedra.

Luminescence induced by either mechanical or chemical stimulation of the dinoflagellate Gonyaulax shows a typical rhythm, the brightest occurring about 6 hours after onset of darkness in a light-dark cycle, and dimmest about 12 hours later. A new technique for bioluminescence stimulation in G. polyedra is reported. The difference in the characteristics of luminescence in different phases in continuous darkness was measured with regard to the threshold stimulus needed to trigger luminescence flash kinetics, number of individual flashes, and their intensity. With this technique, in which cells flow through a capillary coil, stimulus intensity may be graduated by varying flow rate. In continuous darkness, threshold stimulus for cells in the middle of the day phase is greater than for cells in the middle of the night phase. Heterogeneity of sensitivity to stimulation among either cells or individual luminescent sources within a cell is suggested. Night-phase cells emit about 14 times as much light as do day-phase cells in continuous darkness. Both luciferin and luciferase activity varies rhythmically. Differences in threshold and number of flashes are evidence for a second component of the circadian rhythm in luminescence, a rhythm in sensitivity to stimulation. (Jones-Wisconsin)
W73-00247

ECOLOGICAL STUDIES ON CRATER LAKES IN WEST CAMEROON ZOOPLANKTON OF BAROMBI MBO, MBOANDONG, LAKE KOTTO AND LAKE SODEN,
Westfield Coll., London (England). Dept. of Zoology.
J. Green.
Journal of Zoology, Vol 166, p 283-301, 1972. 12 fig, 6 tab, 29 ref.

Descriptors: *Standing crops, *Lakes, *Zooplankton, Phytoplankton, Cyanophyta, Rotifers, Copepods, Systematics, Insects, Crustaceans.
Identifiers: *Cameroon, Barombi Mbo (Cameroon), Mboandong (Cameroon), Lake Kotto (Cameroon), Lake Soden (Cameroon), Mesocyclops hyalinus, Mesocyclops leuckarti, Chaoborus, Polyarthra dolichoptera, Hexarthra mira, Brachionus falcatus, Brachionus caudatus, Dwarfing.

Four crater lakes in Northwest Cameroon were studied, two of which are infected with schistosomiasis and are being treated with a molluscicide. The investigation began when Barombi Mbo had been treated to a limited extent, but before the other lakes had received treatment. A systematic and quantitative zooplankton comparison is given. Lake Soden and Barombi Mbo are deep, clear water lakes while Lake Kotto and Mboandong are shallow with dense blue-green algal blooms. None contain Cladocera. The dominant zooplankter in Lake Kotto, Mboandong and Barombi Mbo is Mesocyclops (Thermocyclops) hyalinus; Mesocyclops leuckarti is dominant in Lake Soden; Chaoborus larvae are present in all. In Soden and Barombi Mbo, the dominant rotifer is Polyarthra dolichoptera, but in Kotto and Mboandong, Hexarthra mira, Brachionus falcatus, and B. caudatus constitute most of the rotifers. Zooplankton standing crops are low compared with lakes in the Uganda Kigezi District. Occurrence of dwarfed forms is the most remarkable feature of these zooplankton. Both cyclopoid copepods and the eight identifiable Rotifera species are smaller than in most other localities. Low latitude with constant high temperature, low phytoplankton availability, and low ratio of drainage area to lake area may be factors that contribute to this dwarfing. (Jones-Wisconsin)
W73-00248

EUTROPHICATION OF LAKE 227, EXPERIMENTAL LAKES AREA, NORTHWESTERN ONTARIO, BY ADDITION OF PHOSPHATE AND NITRATE,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
D. W. Schindler, F. A. J. Armstrong, S. K. Holmgren, and G. J. Brunskill.
Journal Fisheries Research Board of Canada, Vol 28, No 11, p 1763-1782, 1971. 26 fig, 3 tab, 74 ref.

Descriptors: *Eutrophication, *Phosphates, *Nitrates, Phytoplankton, Standing crops, Chrysophyta, Chlorophyta, Carbon dioxide, Hydrogen ion concentration, Sodium, Limiting factors.
Identifiers: *Experimental Lakes Area (Ontario), Limiting nutrients.

First year's results of a long-term program to test effect of enriching a small, culturally undisturbed lake with low continuous doses of phosphorus and nitrogen are described, and possible applications to larger, economically more important water bodies, such as the St. Lawrence Great Lakes, discussed. Addition of 0.34 g P as sodium hypophosphate and 5.04 g nitrogen as sodium nitrate/sq m for 17 weeks caused a several-fold increase in phytoplankton standing crop, and a change in dominant species from Chrysophyceae to Chlorophyta. Reactive phosphate concentrations remained at undetectable levels in the epilimnion after fertilization, and inorganic nitrogen concentrations remained low. Most of the added phosphorus and nitrogen was rapidly taken up by phytoplankton and sedimented with the seston. A high standing crop of phytoplankton was maintained, although concentrations of total carbon dioxide decreased and pH values increased to greater than 9 in late summer. During this period of low total carbon dioxide, experiments with polyethylene containers suspended in the lake indicated that carbon was not limiting to algal production and that phosphorus was the primary limiting nutrient. Sodium added with the nutrients remained in the epilimnion until the fall overturn. (Jones-Wisconsin)
W73-00249

CONTRIBUTION BY SNOW TO THE NUTRIENT BUDGET OF SOME SMALL NORTHWEST ONTARIO LAKES,
Fisheries Research Board of Canada, Winnipeg (Manitoba). Freshwater Inst.
Jan Barica, and F. A. J. Armstrong.
Limnology and Oceanography, Vol 16, No 6, p 891-899, 1971. 3 fig, 6 tab, 18 ref.

Descriptors: *Snow, *Nutrients, *Lakes, *Precipitation (Atmospheric), Ice, Oligotrophy, Carbon, Nitrogen, Phosphorus, Calcium, Magnesium, Sodium, Potassium, Chlorine, Sulfates, Seepage, Slush, Freezing, Distribution.
Identifiers: *Nutrient budget, Experimental Lakes Area (Ontario).

At the start of the short productive summer, a sudden release of nutrients from snow and ice melt are important in lakes of the Experimental Lakes Area of the Canadian shield, an uninhabited region E SE from Kenora, Ontario. Nutrient elements on the surface of two of these oligotrophic lakes during winter amounted to 264 mg particulate and 282 mg soluble carbon, 15.5 mg particulate and 43 mg soluble nitrogen, with 1.3 mg particulate and 2.7 mg soluble phosphorus/sq meter. Snowfall contributed 61-92% of this material and the remainder came from lake water by seepage through the ice

and refreezing. Entering the lakes during spring thaws, these nutrients are available for phytoplankton growth. In quantities roughly a 10th of those in the lakes, calcium, magnesium, sodium, potassium, chlorine, and sulfates were found in the snow-ice cover. Great differences in chemical composition can be found between lake water and solid atmospheric precipitation. Distribution of soluble and particulate matter in snow and ice varied somewhat from place to place and with time, and showed stratification. Seepage, slush formation, and freezing forming layered ice and snow cover are described. (Jones-Wisconsin)
W73-00250

ENDOGENOUS RHYTHM OF THE PRODUCTIVITY IN CHLORELLA AND THE INFLUENCE OF LIGHT (ENDOGENE RHYTHMIK DER PRODUKTION-SFAHIGKEIT BEI CHORELLA UND IHRE BEEINFLUSSUNG DURCH LICHT),
Goettingen Univ. (West Germany). Inst. for Plant Physiology.
M. Hesse.
Zeitschrift fur Pflanzenphysiologie, Vol. 67, p 58-77, 1972. 12 fig, 2 tab, 32 ref. English summary.

Descriptors: *Biorthyms, *Metabolism, *Chlorella, *Light, Algae, Growth rates, Chlorophyll.
Identifiers: *Chlorella pyrenoidosa.

Since Chlorella is universally used for algal research, characteristic physiological changes were studied. Under 54 hours of constant dark conditions the autospores of Chlorella pyrenoidosa strain 211-8b were followed by measuring dry-weight, carbohydrate, protein, chlorophyll, and cell number. The changes in activity are endogenous and of a circadian nature and are independent of the developmental stage of the cells. After remaining in continuous dim white light during 'waiting' the rhythm could not be demonstrated and the physiological activity was minimum; transfer from dim light to continuous darkness restored the endogenous rhythm. This change initiates a rhythm in the individual cell and is not a synchronizing factor. When the dark period of the light-dark-change is replaced by dim light, minimum production follows. This is one reason why the productivity per light-hour in continuous light is not as high as under light-dark-change. Appearance of maximum and minimum production after different intervals is due to the difference in growth rate which occurs about 8 hours after the start of light. Similarly there are large differences in the rate of increase of protein and carbohydrate production at the 2nd and 4th hours after start of light depending on the duration of 'waiting' received by the autospores. (Jones-Wisconsin)
W73-00251

APHANOMYCES BLIGHT OF AMAZON SWORD PLANTS,
Florida Univ., Gainesville. Dept. of Plant Pathology.
W. H. Ridings, and F. W. Zettler.
Florida Agricultural Experiment Station, Bureau of Plant Pathology Contribution No. 318, (1971). 16 p, 2 fig, 20 ref. OWRR B-011-FLA (2).

Descriptors: *Pathogenic fungi, *Blights, *Aquatic plants, *Florida, Plant diseases, Systematics, Cytological studies.
Identifiers: *Aphanomyces, *Amazon sword plant, Alismataceous plants, Echinodorus, Phanerogamous plants, Terrestrial plants.

The amazon sword plant (Echinodorus brevipedicellatus) is among the most important aquaria plants grown in Florida. A disease observed on its leaves prompted identification of the causal agent and determination of its pathogenicity to other aquatic and terrestrial plants. It was identified as the fungus Aphanomyces euteiches. In numerous experiments, inoculation with suspensions of its zoospores or mycelial fragments resulted in disease symptoms. It was repeatedly reisolated from diseased tissues but never from healthy tissues. This appears to be the first report of A. euteiches in Florida but how widespread it is among Florida plantings of amazon sword plants is not known; it is a common pest of peas in more northerly latitudes. Speculation as to its origin suggests that it was introduced from abroad, perhaps from the Amazon Basin on aquarium plant shipments, or it may be an exotic strain of this species better adapted to warmer climates than the isolates heretofore studied; or it may have evolved locally, perhaps on a weed species of legume and manifested itself as a pathogen of the amazon sword plant through accidental contamination. The rapid expansion of the aquarium industry merits attention by plant pathologists. (Jones-Wisconsin)
W73-00252

THE OCCURRENCE AND TOXICITY OF A RED TIDE CAUSED BY NOCTILUCA SCINTILLANS (MACARTNEY) EHRENB., IN THE COASTAL WATERS OF HONG KONG,
Hong Kong Univ. Dept. of Zoology; and Hong Kong Univ. Radioisotope Unit.
B. Morton, and P. R. Twentyman.
Environmental Research, Vol 4, p 544-577, 1971. 3 fig, 1 tab, 61 ref.

Descriptors: *Red tide, *Toxicity, Coasts, Dinoflagellates, Beaches, Phytoplankton, Water pollution sources, Salinity, Shellfish, Toxins, Bacteria.
Identifiers: *Noctiluca scintillans, *Hong Kong, Hematological effects.

In the wake of a typhoon, a red tide caused by Noctiluca scintillans affected Hong Kong beaches in June 1971. The typhoon stirred up nutrient-rich bottom deposits and the light southerly winds following the typhoon, accompanied by bright sunshine which increased temperatures, provided optimum conditions for abnormal blooming of an already established population. Noctiluca may have been feeding directly on bacteria present in the polluted waters. The seawater salinity may have been reduced by the rainfall added to the increased effect of the Pearl River. Results of shellfish testing indicated a minimal level of toxicity which may or may not be ascribable to the red tide; there was no reported fish mortality. The injection of seawater from which Noctiluca cells had been filtered into mice, produced a change in the white blood cells. It is concluded that the seawater filtered from the red tide contained some factor which caused a response similar to that produced by bacterial endotoxins. No significant 'endotoxin-like' response was caused by the control sea water collected before the red tide occurrence. (Jones-Wisconsin)
W73-00253

PHOTOPERIODIC ENTRAINMENT PATTERNS IN THE CO2 OUTPUT OF LEMNA PERPUSILLA 6746 AND OF SEVERAL OTHER LEMNACEAE,
Brookhaven National Lab., Upton, N.Y. Dept. of Biology.
W. S. Hillman.
Plant Physiology, Vol 49, p 907-911, 1972. 6 fig, 15 ref.

Descriptors: *Photoperiodism, *Entrainment, *Carbon dioxide, Nitrates, Model studies, Temperature, Biorhythms.
Identifiers: *Entrainment patterns, *Lemna perpusilla 6746, Circadian rhythm.

Carbon dioxide output of Lemna perpusilla strain 6746 reflects the activity of an endogenous circadian rhythm that is probably involved in photoperiodic timing. 'Skeleton photoperiods' consisting of alternating 10-1/2 hour and 13-hour dark periods separated by 1/4-hour illuminations under stable high and low nitrate conditions were developed and the carbon dioxide output of Lemna perpusilla measured. The phase relationship finally attained between light schedule and output is the same regardless of which dark period is given first but entrainment is more rapid (as in flowering) with an initial 13-hour dark period. In all respects other than bistability--the assumption of two different stable phase relations depending on the initial dark period--both flowering and the course of carbon dioxide output conform to Pittendrigh's model derived from Drosophila eclosion rhythms, confirming that an endogenous circadian rhythm, or biological clock, underlies the photoperiodic control of flowering in this plant. Earlier results on long light exposures were due in part to temperature changes making it clear that entrainment patterns with high nitrate differ more from those in low nitrate than previously thought. Other Lemnaceae showed a variety of responses with no obvious correlation to photoperiodic response type. (Jones-Wisconsin)
W73-00254

THE INTERLABORATORY PRECISION TEST. AN EIGHT LABORATORY EVALUATION OF THE PROVISIONAL ALGAL ASSAY PROCEDURE BOTTLE TEST,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
C. M. Weiss, and R. W. Helms.
Environmental Protection Agency, National Eutrophication Research Program, October 1971. 70 p, 10 fig, 16 tab, 3 append. EPA Program 16010 DQT.

Descriptors: *Analytical techniques, *Algae, Evaluation, Testing, Assay, Nutrients, Cultures, Measurement, Laboratory tests, Bioassay.
Identifiers: *PAAP test, *Algal growth, Bottle test.

A comparative experiment to evaluate the 'Bottle Test' of the Provisional Algal Assay Procedure by eight laboratories required all participants to follow a set of prescribed conditions and procedures using common materials and cultures with their results being subjected to statistical analysis for the purposes of answering the question of what is the inherent variability that might be expected in an algal assay bottle test. All laboratories prepared their test media from a common batch of reagents supplied by one laboratory and all used fresh subcultures of Selenastrum capricornutum obtained from the National Eutrophication Program. A regression analysis for each of the laboratories, individually and for all eight combined, was carried out. In the final assessment the results of all eight laboratories can be considered as a test unit and the degree of variation or coefficient of variation computed to establish the expected order of precision for this type of assay. The data on the average values and coefficient of variation of the mean indicated a certain degree of consistency among various measuring parameters as well as which would be preferable. (Jones-Wisconsin)
W73-00255

ECOLOGY OF PHYTOPLANKTON OF THE VOLTA LAKE,
Ghana Univ., Legon. Volta Basin Research Project.
S. Biswas.
Hydrobiologia, Vol 39, No 2, p 277-288, 1972. 8 fig, 6 tab, 19 ref.

Descriptors: *Phytoplankton, *Algae, *Dissolved oxygen, Photosynthesis, Turbidity, Light penetration, Impoundments, Seasonal, Color, Iron, Physicochemical properties, Diatoms, Dominant organisms.
Identifiers: *Volta Lake (Ghana), Actinastrum gracilimum, Cryptomonas erosa, Peridinium africanum, Nitzchia acicularis, Synedra acus.

The changes which took place in the physicochemical conditions in a new impoundment of the Volta River, Ghana are examined in relation to the phytoplankton. A correlation between the dissolved oxygen and phytoplankton, not observed before, was found. Initially filled with opalescent brown flood water rich in iron, a decrease in transparency lowered the photosynthetic activity of the phytoplankton. Data from the lower reaches of the Volta Lake on transparency, color, total iron, and dissolved oxygen revealed significant changes from 1965 to 1966, but not from 1966 to 1967 though a common seasonal pattern was evident. These factors showed correlations of such significance that many of them could be estimated from a simple measurement of the transparency alone. The phytoplankton density did not change significantly either from 1965 to 1966 or from 1966 to 1967. The chief constituents, however, passed through a series of changes from a green alga (Actinastrum) in early 1965 to the flagellates (Cryptomonas and Peridinium) during 1965 to 1966, to the diatoms (Nitzschia and Synedra) during 1966 to 1967. The phytoplankton density correlated significantly only with the dissolved oxygen from which it could be roughly estimated. (Jones-Wisconsin)
W73-00256

AN ECOLOGICAL INVESTIGATION OF THE CHIRONOMIDAE (DIPTERA) FROM A DANISH LOWLAND STREAM (LINDING A),
Copenhagen Univ., Hillerod (Denmark). Freshwater-Biological Lab.
C. Lindegaard-Petersen.
Archiv fur Hydrobiologie, Vol 69, No 4, p 415-507, 1972. 11 fig, 3 tab, 66 ref.

Descriptors: *Diptera, *Streams, *Europe, Distribution, Habitats, Systematics.
Identifiers: *Chironomids, *Denmark, Linding A (Denmark), Macropelopiini, Pentaneurini, Diamesini, Orthocladiini, Metriocnemini, Chironomini, Tanytarsini.

The Chironomidae of Linding A, a Danish lowland stream, were studied on the basis of monthly collections from January 1964 to May 1965 from nine stations in the main stream. Larvae for rearing adults were collected during 1967 to 1969. Of the 67 chironomid species, 21 have not been given specific identification. Frequency of the single most abundant species in each month for all stations has been diagramed showing also the total number of individuals caught at each station. The distribution of each species in the stream and throughout Europe, and where possible, information about habitat and food source, are discussed. The larva of Microcricotopus rectinervis is described and compared with that of M. bicolor. Differences in chironomid species are small at the nine stations, however due to a strong precipitation of ochre, station 1 contrasts with the others. The chironomid species associated with five different substrates are given. Linding A resembles a lower mountain brook rather than a lowland river, based on the percentage composition of various subfamilies which may be due to low summer temperatures. (Jones-Wisconsin)
W73-00257

SURVIVAL CHARACTERISTICS OF SALMONELLA IN THE FORT LOUDOUN RESERVOIR,
Tennessee Univ., Knoxville. Water Resources Research Center.
P. B. O'Connor.
Report No 16, MS thesis, June 1972. 54 p, 10 fig, 3 tab, 28 ref.

Descriptors: *Pathogenic bacteria, *Salmonella, *Longevity, *Reservoirs, *Tennessee, Coliforms, Mortality, Indicators, E. Coli, Water pollution effects, Fungi, Biological treatment, Waste treatment, Degradation (Decomposition).
Identifiers: *Fort Loudoun (Tenn.), Salmonella typhimurium.

The persistence of the indicator organism, Escherichia coli, and a waterborne pathogen, Salmonella typhimurium, was determined and compared by use of dialysis cells. The research was conducted in Fort Loudoun Reservoir (Tennessee) where water qualities varied from 'clean' to 'polluted' from municipal storm-water drainage, agricultural run-off, urban drainage, and wastewater treatment plant discharges of domestic and industrial wastes. In all cases, the fecal coliform bacteria survived longer than the Salmonella. Die-away rates of the Salmonella were greater than those of the fecal coliform bacteria. Both the fecal coliform bacteria and the Salmonella showed increased persistences and decreased die-away rates directly downstream from the outfall of the sewage treatment plant which may be attributed to increased levels of bacterial nutrients; however, any number of variables and their combinations could have been responsible. Regardless what the actual influences were, conditions did not appear as favorable for Salmonella as for E. coli. The cellulolytic destruction of the dialysis materials during the investigation by a symbiotic growth, predominantly a fungus suspected to be of the Phycomycetes class, has important implications in industrial and solid waste treatment. (Jones-Wisconsin)
W73-00258

HYDROLOGIC EFFECTS OF URBANIZATION IN THE UNITED STATES,
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 03D.
W73-00261

INVENTORY OF ESTUARINE SITE DEVELOPMENT LAGOON SYSTEMS: NEW JERSEY SHORE,
Rutgers - The State Univ., New Brunswick, N.J. Water Resources Research Inst.
G. H. Nieswand, C. W. Stillman, and A. J. Esser.
Available from the National Technical Information Service as PB-212 583, $3.00 in paper copy, $0.95 in microfiche. New Jersey Water Resources Research Institute, New Brunswick, Sept. 1972. 36 p, 11 tab, 4 fig. OWRR B-040-NJ (1).

Descriptors: *Lagoons, *Sites, Estuaries, Resource development, Wetlands, *New Jersey, Recreation.
Identifiers: *Housing.

An inventory of estuarine site development lagoon systems along the New Jersey shore was developed for that portion of the shoreline extending from Sandy Hook to Cape May Point. Lagoon systems were identified by a visual inspection of air photo index sheets. Using enlarged contact prints, the following information was subsequently developed for each lagoon system: location, area, lagoon developed shoreline, inland penetration, total length of lagoons, remote point along lagoons, total length of roads, and number of houses. Supplementary information, including lagoon development names, dredging permit dates, data regarding the status of sanitary sewers, and the total number of lots in each lagoon system, was also obtained. The data indicate that a substantial amount of lagoon development exists along the New Jersey shore from Sandy Hook to Cape May Point. A total of 14.2 square miles of lagoon systems were identified along this shoreline, 53.8 miles of lagoon developed shoreline, 166.1 miles of lagoons, 188.0 miles of lagoon system roads, 29,824 lagoon lots, and 14,591 houses.
W73-00265

POLYCHLORINATED BIPHENYLS IN COHO SALMON FROM WATERS OF LAKE MICHIGAN,
Michigan State Univ., East Lansing. Inst. of Water Research.
For primary bibliographic entry see Field 05A.
W73-00270

RESISTANCE TO DDT OF A FRESHWATER ALGA,
Oberlin Coll., Ohio. Dept. of Biology.
D. A. Egloff, and R. Partridge.
The Ohio Journal of Science, Vol 72, No 1, p 6-10, January 6, 1972. 1 fig, 1 tab, 18 ref.

Descriptors: *DDT, *Resistance, *Plant physiology, Cultures, Photosynthesis, Aquatic algae, Chlorophyll, Oxygen, Respiration, Chlorinated hydrocarbon pesticides, Growth rates, Environmental effects, Phytoplankton, Chlamydomonas, Chlorophyta, Water pollution effects, Absorption, Pesticide toxicity, Laboratory tests.
Identifiers: *Chlamydomonas reinhardtii, Culture media, Chlorinated hydrocarbons.

Laboratory cultures of a freshwater alga (Chlamydomonas reinhardtii) were exposed to DDT (100 - 1,000 ppb) for 16 - 96 hours at 18 - 22 C in an inorganic basal medium with and without acetate to determine its effects on growth photosynthesis, respiration, and chlorophyll concentration. Experimental data showed that the amount of chlorophyll, oxygen evolution in the light, and oxygen uptake in the dark were unaffected by exposure to DDT. Growth rate and final cell density were identical in control and experimental cultures exposed to 1000 ppb DDT in the growth medium for nine days at 22 C. (Snyder-Battelle)
W73-00281

CONTAMINANTS IN PENTACHLOROPHENOL: CHLORINATED DIOXINS AND PREDIOXINS (CHLORINATED HYDROXY-DIPHENYLETHERS),
National Swedish Environment Protection Board, Stockholm.
For primary bibliographic entry see Field 05A.
W73-00285

BORON IN SWEDISH AND NORWEGIAN FRESH WATERS,
Uppsala Univ. (Sweden). Inst. of Limnology.
For primary bibliographic entry see Field 05B.
W73-00286

PHYSIOLOGICAL EFFECTS OF DISSOLVED OXYGEN TENSION AND REDOX POTENTIAL ON GROWING POPULATIONS OF MICRO-ORGANISMS,
Shell Research Ltd., Sittingbourne (England). Borden Microbiological Lab.
D. E. F. Harrison.
Journal of Applied Chemistry and Biotechnology, Vol 22, No 3, p 417-440, March 1972. 9 fig, 4 tab, 128 ref.

Descriptors: *Growth rates, *Microorganisms, *Environmental effects, *Dissolved oxygen, *Oxidation-reduction potentials, Yeasts, Protozoa, Animal physiology, Cultures, Respiration, Metabolism, Enzymes, Deficient elements, E. coli, Enteric bacteria, Pseudomonas, Adaptation.
Identifiers: *Microbial physiology, Chemostats, Turbidostats, Dissolved oxygen analyzers, Substrate utilization, Mutation, Torula utilis, Penicillium chrysogenum, Klebsiella aerogenes, Haemophilus parainfluenzae, Aspergillus indulans, Spirillum itersonii, Saccharomyces cerevisiae, Staphylococcus epidermidis, Azotobacter vinelandii, Bacillus licheniformis, Candida utilis, Saccharomyces carlsbergensis, Micrococcus dinitrificans, Achromobacter.

The available literature on the effects of oxygen on growing cultures of microorganisms was analyzed to determine the mechanisms by which the growing microorganisms respond to oxygen concentration and to the oxidizing potential of the environment. Techniques used for studying the responses in continuous cultures included the chemostat, the turbidostat, oxygen feed limitation cells, and dissolved oxygen probes. The effects of dissolved oxygen tensions on respiration rates,

respiratory enzyme adaptation, and metabolic pattern adaptation are described. The control mechanisms involved in these responses were difficult to interpret due to their highly variable nature. At least four levels of response were distinguished in growing microorganisms: (1) a primary response with no feedback; (2) a response through feedback control of metabolic pathways; (3) a response through protein synthesis; and (4) a response through selection of mutants during many generations. Since growing cells may exhibit a variety of responses to environmental changes, a simplified model interaction between dissolved oxygen tension and growing cells is not available. (Pestel-Battelle)
W73-00294

DISTRIBUTION AND ECOLOGY OF CERATIUM EGYPTIACUM HALIM AND ITS VALIDITY AS INDICATOR OF THE CURRENT REGIME IN THE SUEZ CANAL,
Alexandria Univ. (Egypt). Dept. of Oceanography.
For primary bibliographic entry see Field 05B.
W73-00296

PATHOLOGICAL EFFECTS IN FORMALIN--TREATED RAINBOW TROUT (SALMO GAIRDNERI),
Bureau of Sport Fisheries and Wildlife, Bozeman, Mont. Fish Cultural Development Center.
C. E. Smith, and R. G. Piper.
Journal Fisheries Research Board of Canada, Vol 29, No 3, p 328-329, March 1972. 7 fig, 9 ref.

Descriptors: Water pollution effects, *Animal pathology, *Rainbow trout, Toxicity, Fishkill, Fish physiology, Laboratory tests, Organic compounds, Mortality, Aquatic environment, Water pollution, Chemical wastes, Dissolved oxygen, Freshwater fish, Microscopy, Water temperature, Bioassay.
Identifiers: *Formalin, *Histopathology, Biochemical tests, Blood, Tissue, Gills, Kidneys, Liver, Spleen, Brain, Pseudobranch, Pyloric caeca, Stomach, Intestines, Adrenal glands, Organic solvents.

The histological and hematological effects of formalin on the rainbow trout, Salmo gairdneri, were investigated under laboratory conditions. Two groups of 100 rainbow trout were exposed to 167 ppm formalin for 1 hr in concrete troughs containing 760 gal of water. The water temperature was 12.8 C. Another group of 100 fish served as controls. In another experiment, two groups of 100 fish were exposed to 250 ppm for 1 hr. After the exposures, the troughs were immediately drained and refilled with fresh water. Dissolved oxygen content of the water was monitored over the 1-hr period with a YSI oxygen meter and remained relatively constant at 7-8 ppm. Within 3 hr of exposure, 5 dying fish were sectioned and stained with hematoxylin and eosin for histological examinations of the gill, kidney, liver, spleen, brain, pseudobranch, adrenal cortex, intestine, pyloric caeca, and stomach tissue. Hematocrits as well as blood smears were also examined. Severe pathological changes were observed, especially in gill tissue, and hypoxia was the apparent cause of death. Increased hematocrits resulted from the hypoxia following gill damage. The average mortality for fish subjected to 167 and 250 ppm formalin was 4 and 6 percent, respectively. Death usually occurred within 2-4 hr after exposure. (Long-Battelle)
W73-00297

A NEW GAS VACUOLATED HETEROTROPHIC ROD FROM FRESHWATERS,
North Carolina Univ., Chapel Hill. Dept. of Environmental Sciences and Engineering.
M. Van Ert, and J. T. Staley.
Arch Mikrobiol. Vol 80, No 1, p 70-77. 1971. Illus.
Identifiers: *Heterotrophic rod, *Eutrophic lakes, Oxygen depletion, Gas vacuoles.

A gas vacuolated rod was isolated from the O2-depleted zone of a eutrophic lake. It is a nonmotile, euryoxic, gram-negative heterotroph that grows slowly under all conditions tested. The vesicles of the gas vacuoles of the bacterium resemble those of other gas vacuolate prokaryotes, as demonstrated by electron microscopy. The taxonomy of the isolate is discussed but no names are proposed.--Copyright 1972, Biological Abstracts, Inc.
W73-00298

BIOLOGICALLY ACTIVE COMPOUNDS IN THE AQUATIC ENVIRONMENT: THE EFFECT OF DDE ON THE EGG VIABILITY OF CHIRONOMUS TENTANS,
Michigan State Univ., East Lansing. Pesticide Research Center.
S. K. Derr, and M. J. Zabik.
Bulletin of Environmental Contamination and Toxicology, Vol. 7, No. 6, p 366-368, June 1972. 1 tab, 5 ref.

Descriptors: *DDE, Water pollution effects, *Aquatic environment, *Viability, Chlorinated hydrocarbon pesticides, Freshwater, Midges, Diptera, Laboratory equipment, Animal physiology, Fecundity, Pesticide toxicity, Aquatic insects.
Identifiers: *Chironomus tentans, *Eggs, p p' DDE.

The effects of p,p'-DDE residues on egg viability of the aquatic midge, Chironomus tentans, were investigated under laboratory conditions. Experimental cultures of midge eggs were incubated in 4 aquaria for 28-35 days. Two of the aquaria contained 30 ppb DDE, with the other two serving as controls. The adults emerging were collected separately and allowed to mate. The resultant egg masses from these DDE exposed and control females were then incorporated into four different experimental treatments: the result showed a significant reduction in the number of C. tentans adults emerging from aquaria that contained DDE contaminated egg masses. However, the presence of 20 ppb p,p'-DDE in the water with control (uncontaminated) eggs did not show a significant reduction in the number of adults emerging. The combination of DDE treated water and DDE contaminated eggs also demonstrated no significant difference from DDE contaminated eggs alone. (Long-Battelle)
W73-00310

EFFECTS OF WARM WATER EFFLUENTS FROM POWER STATIONS ON MARINE LIFE,
Dunstaffnage Marine Research Lab., Oban (Scotland).
P. R. O. Barnett.
Proceedings of the Royal Society of London, Series B, Vol 180, No 1061, p 497-509, March 21, 1972. 10 fig, 27 ref.

Descriptors: *Effluents, *Power plants, *Thermal pollution, *Aquatic life, *Water pollution effects, *Animal physiology, Marine animals, Water temperature, Larvae, Growth stages, Chlorine, Shellfish, Gastropods, Clams, Sampling, Snails, Pollutant identification, Heated water, Outlets, Mollusks, Spawning, Mortality, Growth rates.
Identifiers: Tellina tenius, Nassarius reticulatus, Eggs.

A brief review is given of recent work on the biological effects of thermal pollution in the British Isles. Some of the effects of the Hunterston Generating Station, Ayrshire, Scotland are briefly described. Experimental work suggests that the planktonic larvae of the locally abundant bivalve Tellina tenuis are unlikely to be harmed by heating during passage through the cooling system. On the other hand, growth of the gastropod Nassarius reticulatus is affected on a beach near the outfall. Spawning times of this species are advanced by about 3 months compared with a locality not affected by warm water. Experiments also show that hatching of Nassarius egg capsules is more rapid at higher temperatures. Some possible implications of thermal pollution are discussed. (Long-Battelle)
W73-00347

OCCURRENCE OF ELECTRA CRUSTULENTA (BRYOZOA) IN RELATION TO LIGHT,
Stockholm Univ. (Sweden). Asko Lab.; and Stockholm Univ. (Sweden). Dept. of Zoology.
L. Silen, and B-O. Jansson.
Oikos, Vol 23, No 1, p 59-62, 1972. 2 fig, 10 ref.

Descriptors: *Light, *Growth rates, *Environmental effects, Larvae, On-site tests, Invertebrates, Water pollution effects, Ecology, Sea water, Laboratory equipment, Inhibition, Ecological distribution, Marine algae, Marine animals.
Identifiers: *Electra crustulenta, *Bryozoa.

Experiments were performed to relate the occurrence of new bryozoan (Electra crustulenta) colonies and the reactions of larvae to light. To test the effects of light on bryozoan colonies, various settling experiments were carried out at different times of the year by allowing the invertebrates to settle on a substrate having both an illuminated and shadowed surface. A black polyethene tube was used as a substrate for these sessile organisms, since illuminated organisms living on the tube's surface could be directly compared to organisms on a permanently shadowed interior. Photic responses of larvae, in different stages of development, were examined by placing the bryozoans in sea water (15C) and exposing them to light. Results showed that bryozoans were able to grow on either light or dark surfaces; however, larvae showed a weak preference for dark surfaces. Direct illumination of larvae appeared to have no effect. Conversely, light could indirectly affect the settling of bryozoan larvae or the growth of colonies by resulting in algal growth which is inhibitory to the bryozoans. (Long-Battelle)
W73-00348

PREDICTING THE EFFECT OF POLLUTION IN ESTUARIES,
Water Pollution Research Lab., Stevenage (England).
M. J. Barrett.
Proceedings of the Royal Society of London, Series B, Vol 180, No 1061, p 511-520, March 21, 1972. 7 fig, 4 ref.

Descriptors: *Mathematical models, *Water pollution effects, Statistical methods, Estuaries, Water quality, Distribution patterns, Organic wastes, Diffusion, Tides, Circulation, Nitrification, Bacteria, Activated sludge, Bioindicators, Dissolved oxygen, Nitrogen, Nitrates, Ammonia, Carbon, Eddies, Currents (Water), Water temperature, Kinetics, Nitrites, Mixing.
Identifiers: *Experimental design, Thames River, Nitrosomonas, Nitrobacter.

The use of mathematical models to predict the effects of pollutant addition to estuaries is discussed. Methods were developed earlier for predicting the distribution of dissolved oxygen and ammoniacal and oxidized nitrogen in the Thames estuary. These methods are reviewed and more recent developments in the application of modeling are described. The methods are based on evolving a series of equations specifying the rate at which the concentration of a pollutant at a given point in the estuary is changed by the process to which it is exposed, e.g., dispersion by tidal action, biodegradation, or chemical transformation. The appropriate equations can be solved to give predictions of water quality for given situations. The methods devised in the Thames study proved very successful. A model has been derived for calculating temperature and dissolved oxygen distributions based on mixing processes. Another model is used to describe the kinetics of nitrifica-

tion in the activated-sludge process. The equations are based on the concept that the rates of oxidation of ammonia and nitrite are proportional to the rates of growth of Nitrosomonas and Nitrobacter and that these growth rates are proportional to the concentration of the bacteria and a function of the concentration of ammonia or nitrite. (Mortland-Battelle)
W73-00349

METABOLIC TRANSFORMATION OF DDT, DIELDRIN, ALDRIN, AND ENDRIN BY MARINE MICROORGANISMS,
Wisconsin Univ., Madison. Dept. of Entomology.
For primary bibliographic entry see Field 05B.
W73-00361

ECOLOGICAL ENERGETICS OF THE SEA-WEED ZONE IN A MARINE BAY ON THE ATLANTIC COAST OF CANADA. II. PRODUCTIVITY OF THE SEAWEEDS,
Bedford Inst., Dartmouth (Nova Scotia).
K. H. Mann.
Marine Biology, Vol 14, No 3, p 199-209, June 1972. 6 fig, 5 tab, 22 ref.

Descriptors: *Growth rates, *Primary productivity, Energy budget, *Marine algae, Marine plants, Biomass, Canada, Coasts, Atlantic Ocean, Seasonal, Bays, Sea water, Organic matter, Mortality, Water temperature, Phaeophyta, Sampling, Scuba diving, Ecology, Standing crops, Path of pollutants.
Identifiers: *Seaweeds, Laminaria longicruris, Laminaria digitata, Agarum cribrosum, *Nova Scotia, *St. Margaret's Bay.

SCUBA diving techniques were used to follow the growth of seaweeds in St. Margaret's Bay, Nova Scotia over a 2-year period. It was found that the blades of Laminaria longicruris, L. digitata, and Agarum cribrosum turn over their biomass many times a year and have among the highest productivities of any natural community. The SCUBA divers punched holes of about 5 mm diameter at a distance of 10 cm from the junction of stripe and blade. The movement of these holes was followed throughout the seasons and new holes were punched when the old ones approached the tips of the blades. The blades were found to behave like moving belts of tissue, growing at the base and eroding at the tips. All sizes of plants grew about 200 cm annually with the year's growth amounting to 1-5 times the initial length. Biomass increase was approximately proportional to the square of the length increment. Maximum growth rates were achieved between January and April when water temperature was close to O C. Minimum rates occurred in the July-October period. These plants make a considerable contribution to the productivity of coastal waters. Since their maximum growth is at lower temperatures, this contribution may be more significant in northern waters. (Mortland-Battelle)
W73-00366

ENVIRONMENTAL FACTORS AFFECTING THE STANDING CROP OF FORAMINIFERA IN SUBLITTORAL AND PSAMMOLITTORAL COMMUNITIES OF A LONG ISLAND SALT MARSH,
City Coll., New York. Dept. of Biology.
N. J. Matera, and J. J. Lee.
Marine Biology, Vol 14, No 2, p 89-103, May 1972. 9 fig, 6 tab, 38 ref.

Descriptors: *Salt marshes, *Protozoa, *Biological communities, *Environmental effects, *Standing crops, Tidal effects, Marine algae, Sea water, Salinity, Sampling, Cores, Distribution patterns, Currents (Water), Particle size, Sediments, Separation techniques, Spatial distribution, Ecological distribution, Benthic fauna, Sieves, Water temperature, Fluorescent dye, Chlorophyta, Phaeophyta.
Identifiers: *Foraminifera, Substrates, Epiphytes, Sample preservation, Sample preparation, Sublittoral, Long Island, Enteromorpha intestinalis, Polysiphonia, Ulva lactuca, Zanichellia palustris, Codium, Fuscus, Macrophytes, Ammobaculites dilatatus, Ammonia beccarii, Ammotium salsum, Elphidium advenum, Elphidium clavatum, Elphidium galvestonense, Elphidium gunteri, Elphicium incertum, Elphidium translucens, Protelphidium tisburyensis, Quinquelocutina lata, Quinquelocutina seminulum, Trochammina inflata, Trochammina macrescens.

Foraminifera samples were collected weekly in the Towd Point salt marsh on Long Island 13 June - 3 September 1968. Algal samples were taken at low tide and deposited in test tubes containing Millipore filtered sea water. One hour after the addition of Rose Bengal to each tube, each sample was preserved with a neutral formalin solution. In the laboratory, a vortex mixer was used to separate the epiphytic community from the macroalgal substrate. The epiphytic community was transferred into ethanol and foraminifera were isolated with a Pasteur pipette and placed on slides for storage and study. Core sediment samples were taken at both high and low tides and prepared and preserved in the same manner. In the laboratory, these samples were sieved and fractions greater than 0.074 mm were transferred to ethanol. Current movement within the sampling area was studied with a fluorescin dye. Some macrophytes provide better substrates for foraminifera than others. Dominant species among foraminifera were Elphidium incestum and Protelphidium tisburyensis. Overall distribution patterns were determined by small rivulets flowing through the marsh which altered water temperature, salinity, and sediment grain size. There was no evidence to suggest that foraminifera migrate in the sediments as a function of tidal changes. (Mortland-Battelle)
W73-00367

SOME EFFECTS OF TEMPERATURE ON THE GROWTH AND METABOLIC RATE OF JUVENILE BLUE CRABS, CALLINECTES SAPIDUS, IN THE LABORATORY,
Florida Univ., Gainesville. Dept. of Zoology.
For primary bibliographic entry see Field 05A.
W73-00368

INFLUENCE OF ENVIRONMENTAL PARAMETERS ON INTRASPECIFIC VARIATION IN FUCUS VESICULOSUS,
Maine Univ., Orono. Dept. of Oceanography; and Maine Univ., Orono. Dept. of Zoology.
A. J. Jordan, and R. L. Vadas.
Marine Biology, Vol 14, No 3, p 248-252, June 1972. 1 fig, 2 tab, 12 ref.

Descriptors: *Phaeophyta, *Salinity, *Environmental effects, *Plant morphology, *Genetics, *Variability, Waves (Water), Maine, Statistical methods, Sea water, Coasts, Marine algae.
Identifiers: *Fucus vesiculosus, Vesiculation, Sample preparation, Branching.

The vesiculation and branching of the marine brown algae, Fucus vesiculosus, were examined for samples taken from three locations on the Maine Coast. These sites were a normal salinity exposed area, a low salinity protected area, and a normal salinity protected area. After collection, the top and bottom of each plant were cut and each segment was numbered and weighed and the vesicles and dichotomies were counted. The vesicles were measured and their volumes calculated. A total of 10 measurements of morphometric characteristics and ratios of these measurements were compared for each of 300 plants by statistical analyses on a computer. The results indicated that decreased salinity correlated with increased vesiculation and branching. Increased wave action correlated with decreased vesiculation. (Mortland-Battelle)
W73-00369

THE SUBLETHAL EFFECTS OF A DETERGENT ON THE REPRODUCTION, DEVELOPMENT, AND SETTLEMENT IN THE POLYCHAETOUS ANNELID CAPITELLA CAPITATA,
Centre d'Oceanographie, Marseille (France). Station Marine d'Endoume.
G. Bellan, D. J. Reish, and J. P. Foret.
Marine Biology, Vol 14, No 3, p 183-188, June 1972. 8 tab, 14 ref.

Descriptors: *Annelids, Water pollution effects, *Toxicity, *Detergents, *Growth stages, *Bioassay, Invertebrates, Worms, Life cycles, Surfactants, Water pollution sources, Benthic fauna, Benthos, Larvae, Larval growth stage, Sampling, Resistance, Reproduction, Animal physiology.
Identifiers: *Capitella capitata, Survival, *Sublethal effects, Polychaetes, Polyethyleneglycol fatty acid, Sample preparation, Trochophores, Metatrochophores, Eggs, Fatty acids.

Polyethylene-glycol fatty acid was used to investigate the sublethal effect of detergents on the various growth stages of the polychaete Capitella capitata. Measurements of sublethal effects on both laboratory-reared and field-collected animals were based on the survival of juveniles, appearance of egg masses, number of eggs produced, number of trochophore and metatrochophore larvae, and young benthic worms. To produce these effects, worms from the laboratory and field were exposed to detergent concentrations of 100, 10, 1.0, 0.1, and 0.01 mg per ml. All concentrations tested reduced the number of trochophores, metatrochophores, and young benthic worms and increased the time required to reach the next stage. This time was inversely proportional to concentration. Only higher concentrations influenced survival rate and the number of eggs produced and laid. A 90 percent decrease in the number of benthic worms produced occurred between the control and the 100 mg concentration employed. The effect of the detergent was similar with both field-collected and laboratory reared larvae. (Long-Battelle)
W73-00370

ORGANOCHLORINES AND MERCURY IN COMMON EGRETS AND GREAT BLUE HERONS,
Wisconsin Univ., Madison. Dept. of Wildlife Ecology.
R. A. Faber, R. W. Risebrough, and H. M. Pratt.
Environmental Pollution, Vol 3, No 2, p 111-122, April 1972. 3 tab, 36 ref.

Descriptors: *Mercury, *Chlorinated hydrocarbon pesticides, Water pollution effects, *Bird eggs, *Reproduction, Pesticide residues, Heavy metals, Polychlorinated biphenyls, Wading birds, Water birds, Breeding, Water pollution sources, Path of pollutants, DDE, DDT, Dieldrin, Endrin, Solvent extractions, Neutron activation analysis, Radiochemical analysis, Chemical analysis, Separation techniques, Aquatic animals, Hatching, Lipids, Mortality, X-ray spectroscopy.
Identifiers: *Eggshell, Detection limits, Sample preparation, Gamma-ray spectrometry, Thickness, Casmerodius albus, Ardea herodias, Cymatogaster aggregata, Hyperprosopon argenteum, Liver, Muscle, Brain, Walleye surfperch, Shiner perch, *Heron, *Egret, Precision, Tissue, Biological samples.

Egrets and herons were examined for the effects of chlorinated hydrocarbon pesticides and Hg on their breeding and reproductive success. To determine effects, eggshells of these birds were collected once a week throughout nesting season and eggshell thickness was measured. Levels of DDT compounds, dieldrin, endrin, and PCB were analyzed in extracted samples of eggshell and adult egret brain, liver, and breast-muscle by methods described by Risebrough. Multichannel gamma-ray spectrometry was used to measure Hg

in liver samples. The remainder of the carcasses, minus feet and feathers, was homogenized for determination of residues in lipid. The mean thickness of an egret and heron eggshells (calculated with a 95 percent confidence limit) were 15.2 and 10.4 percent lower, respectively, than pre-1947 values. Eggs of both species, broken during incubation, were 17 percent below normal. PCB's ranged from up to 15 ppm in brain and 93 ppm in livers of adult egrets, and total Hg ranged between 2 and 95 ppm. Dieldrin in egret brain ranged from 5 to 7 ppm. As a result of these pollutants, reproductive success from 1967 to 1970 decreased from 52 to 28 percent and nests losing eggs increased from 30 to 54 percent. (Long-Battelle)
W73-00373

PRODUCTION OF DISSOLVED ORGANIC MATTER FROM DEAD GREEN ALGAL CELLS. I. AEROBIC MICROBIAL DECOMPOSITION,
Tokyo Metropolitan Univ. (Japan). Dept. of Chemistry.
A. Otsuki, and T. Hanya.
Limnology and Oceanography, Vol 17, No 2, p 248-257, March 1972. 12 fig, 3 tab, 28 ref.

Descriptors: *Aerobic bacteria, *Aerobic conditions, *Kinetics, *Scenedesmus, *Dissolved solids, *Microbial degradation, Carbon, Organic matter, Water pollution sources, Chlorophyta, Aquatic productivity, Aquatic algae, Nitrogen, Pollutant identification, Environmental effects, Laboratory equipment, Freeze drying, Separation techniques, Solvent extraction, Mathematical studies, Systematics, Metabolism.
Identifiers: Fate of pollutants, Substrate utilization, Organic nitrogen, Organic carbon, Culture media, Paper chromatography, Infrared spectroscopy, Assimilation, Kjedahl procedure, Sample preparation.

The production of dissolved organic matter (DOM) from dead green algal cells (Scenedesmus) by aerobic bacteria was investigated with particular emphasis on the patterns and kinetics of C and N. DOM was prepared for experimental use by freeze-drying and ashing approximately 99 percent pure cultures of Scenedesmus. Aerobic decomposition of the DOM was initiated by inoculating microflora into a specially prepared decomposition apparatus containing culture media and DOM at pH 7. After incubation, dissolved organic carbon (DOC) and nitrogen (DON) were measured by an elemental analyzer and by the micro-Kjeldahl method. Organic materials, such as protein and amino acids, were extracted by thin-layer chromatography for IR-spectroscopic analysis. The DOM production, by the 30th day of incubation, was about 7 percent C and 6 percent N. Aerobic microbial decomposition approximated a first order reaction during this period. Kinetic considerations of the decomposition pattern of the cell nitrogen and the production of DON suggest that dead algal cell substance may be divided into labile and refractory constituents by their relative resistance to the action of bacteria. The dissolved organic nitrogenous material produced is composed of two major fractions: one is produced with the decomposition of algal cells, and the other is probably excreted by bacteria through reassimilation of mineralized nitrogen. (Long-Battelle)
W73-00379

UTILIZATION OF UREA BY SOME MARINE PHYTOPLANKTERS,
Woods Hole Oceanographic Institution, Mass.
E. J. Carpenter, C. C. Remsen, and S. W. Watson.
Limnology and Oceanography, Vol 17, No 2, p 265-269, March 1972. 1 fig, 3 tab, 19 ref.

Descriptors: *Phytoplankton, *Marine algae, Chemical analysis, *Nitrates, *Ammonia, Diatoms, Growth rates, Nitrogen, Water pollution effects, Radioactivity, Metabolism, Plant physiology, Chrysophyta, Cultures, Sea water, Nutrient requirements, Water pollution.
Identifiers: *Substrate utilization, *Sargasso Sea, Coccolithophorids, Flagellates, Fate of pollutants, Stephanopyxis costata, Assimilation, Emiliana (Coccolithus) huxleyi, Amphiprora alata, Chrysochromulina, Skeletonema, Chaetoceros simplex.

The possible existence of additional urea-utilizing phytoplankters in offshore and inshore areas was investigated and their growth rates on urea, nitrate, and ammonia were compared. The concept of whether these species can assimulate urea at significant rates at the concentrations present in their normal habitats was also considered. Three diatoms from the Sargasso Sea and two diatoms and a haptophyte flagellate from an inshore area near Woods Hole were found to exhibit similar growth rates on urea, nitrate, and ammonia. A coccolithophore Emiliana (Coccolithus) huxleyi from the Sargasso Sea did not grow on urea. The half-saturation constant for urea determined for one inshore diatom, Stephanopyxis costata (Skeletonema costatum), was 8.5 micrograms-atom urea-N/liter. At the urea concentrations of its habitats, the calculated division rate for this species, growing on urea as the sole nitrogen source, was 2.2 days, similar to that of diatoms growing in inshore habitats. It appears, from data on natural urea concentrations and urea uptake rates by S. costata, that urea can be a significant N source for at least one common inshore phytoplankter. According to growth rate studies, at least three inshore and three offshore marine phytoplankton can grow as rapidly on urea as on nitrate or ammonia. (Byrd-Battelle)
W73-00380

VERTICAL MIGRATIONS OF DAPHNIA AND COPEPODS UNDER THE ICE,
Yale Univ., New Haven, Conn. Osborn Memorial Labs.
L. Cunningham.
Limnology and Oceanography, Vol 17, No 2, p 301-303, March 1972. 2 fig, 4 ref.

Descriptors: *Vertical migration, *Daphnia, *Copepods, *Iced lakes, *Connecticut, Physiological ecology, Biorhythms, Zooplankton, Cold resistance, Waterfleas, Crustaceans, Animal behavior, Water temperature, Predation, Turbidity, Mesotrophy, Sampling, Migration patterns, Nocturnal, Distribution patterns.
Identifiers: *Fuller Pond (Conn), Diaptomus minutus, Cyclops scutifer, Daphnia galatea mendotae, Bosmina longirostris, Arthropods.

Quantitative sampling was made through the ice of Fuller Pond of the copepods Diatomus minutus and Cyclops scutifer. A pronounced reverse nocturnal migration was shown for these species. Daphnia galeata mendotae, sampled at the same time, showed little vertical migration. (Byrd-Battelle)
W73-00382

SALMONELLA TESTING OF POOLED PRE-ENRICHMENT BROTH CULTURES FOR SCREENING MULTIPLE FOOD SAMPLES,
Procter and Gamble Co., Cincinnati, Ohio. Winton Hill Technical Center.
For primary bibliographic entry see Field 05A.
W73-00383

SIGNIFICANCE TO EUTROPHICATION OF SPATIAL DIFFERENCES IN NUTRIENTS AND DIATOMS IN LAKE MICHIGAN,
Wisconsin Univ., Milwaukee. Center for Great Lakes Studies.
R. E. Holland, and A. M. Beeton.
Limnology and Oceanography, Vol 17, No 1, p 88-96, January 1972. 4 fig, 1 tab, 22 ref.

Descriptors: *Sampling, *Nutrients, *Diatoms, *Lake Michigan, *Eutrophication, *Spatial distribution, Phosphorus, Nitrates, Silica, Path of pollutants, Organic compounds, Phytoplankton, Carbon, Water temperature, Great Lakes region, Wisconsin, Michigan, Chrysophyta, Plant pigments, Aquatic algae, Nitrogen.
Identifiers: Chlorophyll a, Chlorophyll c, Carotenoids, Fragilaria crotonensis, Tabellaria flocculosa, Stephanodiscus hantzschii, Cyclot michiganiana, Rhizosolenia eriensis, Melosira islandica, Melosira italica, Melosira ambigua, Synedra filiformis, Fragilaria capucina, Cyclotella stelligera, Stephanodiscus.

Water samples were taken from a water-cooling intake at a depth of about 4 m from a railroad ferry between Milwaukee, Wisconsin, and Ludington, Michigan, 27 May 1970 - 6 January 1971, to determine inshore-offshore differences in species and abundance of diatoms, and concentrations of phosphorus, silica, nitrate, and pigments. The various nutrients and pigments were determined, and the diatoms identified by previously described methods. Inshore waters (within 16 km of shore) had greater diatom populations, different species composition within the diatom communities, and different concentrations of major nutrients and pigments than offshore waters (greater than or equal to 16 km from shore). Results indicate that data from water intakes which have been used in the past to document changes in the lake may have represented only local conditions. (Snyder-Battelle)
W73-00384

ECOLOGICAL EFFECTS OF OIL POLLUTION,
Battelle-Northwest, Richland, Wash.
W. L. Templeton.
Journal Water Pollution Control Federation, Vol 44, No 6, p 1128-1134, June 1972. 53 ref.

Descriptors: *Oil pollution, *Aquatic life, *Aquatic environment, Water pollution effects, Oil spills, Oily water, *Environmental effects, Biodegradation, Bioassay, Toxicity, Resistance, Mortality, Herrings, Mussels, Marine plants, Larvae, Birds, Crustaceans, Water fowl, Annelids, Zooplankton, Marine animals, Coral, Phytoplankton, *Reviews.
Identifiers: Oil dispersants, Crude oil, Fate of pollutants, Dinophilus gyrociliatus, Cirriformia tentaculata, Cirratulus cirratus, Spheniscus demersus, Barnacles, Diesel fuel, Mytilus californianus, Clupea harengus, Chthamalus fissus, Phyllospadix torreyi, Hesperophycus harveyanus, Pollicipes polymens, Calanus finmarchicus, Schizoporella unicornis, Mugil cephalus.

Research in the area of ecological effects of oil pollution is reviewed and discussed. The areas include (1) toxicity to aquatic organisms and (2) the fate and behavior of oil as determined from field studies, studies on the effects on birds, and biological degradation studies. (Byrd-Battelle)
W73-00386

EFFECTS ON SURFACE WATERS,
Notre Dame Univ., Ind.
M. W. Tenney.
Journal Water Pollution Control Federation, Vol 44, No 6, p 1204-1208, June 1972. 31 ref.

Descriptors: Surface waters, Water pollution effects, *Water quality, Detergents, *Pesticides, Toxicity, Rivers, Lakes, Trace elements, Lake sediments, Chemical wastes, Fishkill, *Oil wastes, Nuclear wastes, *Industrial wastes, Water pollution sources, Agricultural runoff, Inorganic compounds, Organic compounds, Carbamate pesticides, Chlorinated hydrocarbon pesticides, Organophosphorus pesticides, DDT, Dissolved solids, Sorption, Toxins, Biochemical oxygen demand, Dissolved oxygen, Chlorides, Sulfates, Nitrates, Water temperature, Hydrogen ion concentration, Oil spills, Lake Erie, *Reviews.

Identifiers: Pollution index, Hydrocarbons, Buffalo River, Lake Chautauqua, Internal reflection spectroscopy, Endosulfan, Rhine River, Toxaphene.

A review and discussion are given of the work by researchers concerned with the effects of pollutants on surface waters. The papers cover pollutants such as pesticides, oil and other hydrocarbons, nuclear wastes, industrial wastes, synthetic detergents, and inorganic chemical wastes. (Byrd-Battelle)
W73-00387

OXYGEN SAG AND STREAM SELF-PURIFICATION,
Flood and Associates, Inc., Jacksonville, Fla.
R. E. DeLoach, Jr.
Journal Water Pollution Control Federation, Vol 44, No 6, p 1198-1204, June 1972. 70 ref.

Descriptors: *Oxygen sag, *Self-purification, Water treatment, Reaeration, Dispersion, Computer models, Dissolved oxygen, Mathematical models, Mathematical studies, Temperature, *Biochemical oxygen demand, Water quality control, *Water purification, *Waste assimilative capacity, Bethic fauna, Organic wastes, Water quality, Waste treatment, *Reviews.
Identifiers: Oxygen transfer.

Review of the literature on oxygen sag and stream self purification included consideration of assimilative capacities, models for self-purification and water quality control, application of BOD mass loading, water temperature variations, benthic deposits and oxygen demands, and BOD kinetics. (Byrd-Battelle)
W73-00388

INFLUENCE OF AQUATIC SEDIMENTS ON WATER QUALITY,
Massachusetts Univ., Amherst.
G. W. Foess.
Journal Water Pollution Control Federation, Vol 44, No 6, p 1211-1218, June 1972. 65 ref.

Descriptors: Water pollution effects, *Sediments, *Water quality, Aquatic soils, Oxygen demand, Water pollution sources, Sampling, Absorption, Water analysis, Trace elements, Heavy metals, Sediment transport, Soil analysis, Chemical analysis, Beryllium, Boron, Cobalt, Nickel, *Fluorometry, Iron, Aluminum, Manganese, Bromine, Chromium, Copper, Lead, Zinc, Organic matter, Nutrient cycling, Phosphorus, Inorganic compounds, Eutrophication, Photography, Analytical techniques, Nutrients, *Reviews, Methodology, *Distillation.
Identifiers: Selenium, *Atomic absorption spectrophotometry, Lanthanum, Scandium, Vanadium.

A literature review is presented on the role sediments play on water quality, both as a pollutant and as a transporting or catalytic agent. Sampling and analytical methods such as fluorometry, fractionation, and atomic absorption spectrophotometry are discussed in relation to their value and applications. (Mackan-Battelle)
W73-00389

EFFECTS ON GROUNDWATER,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 05B.
W73-00390

THERMAL POLLUTION AND THE AQUATIC MICROBIAL COMMUNITY: POSSIBLE CONSEQUENCES,
Bowling Green State Univ., Ohio, Dept. of Biology.
R. S. Horvath, and M. M. Brent.
Environmental Pollution, Vol 3, No 2, p 143-146, April 1972. 11 ref.

Descriptors: *Thermal pollution, *Aquatic microorganisms, Water pollution effects, *Aquatic environment, Limnology, Water temperature, E. coli, Cultures, Water pollution, Chlorophyta, Organic matter.
Identifiers: Serratia marcescens, Aerobacter aerogenes, Leuconostoc.

Construction of nuclear power plants to meet increased needs for electricity may create the problem of thermal pollution. This artificial warming of our lakes and rivers could have serious limnological effects. Of primary concern is the effect of thermal pollution on the composition of the biotic community and especially on the activities of the micro-organisms in the aquatic ecosystem. Disruption or alteration of the microbial populations present in a given area will affect all lifeforms present in this environment. (Byrd-Battelle)
W73-00391

THE BDELLOVIBRIOS,
California Univ., Davis. Dept. of Bacteriology.
For primary bibliographic entry see Field 05A.
W73-00393

ON THE ECOLOGY OF SPHAERIIDAE IN A HIGH MOUNTAIN AREA IN SOUTH NORWAY,
Oslo Univ. (Norway). Dept. of Limnology.
K. A. Okland.
Norw J Zool. Vol 19, No 2, p 133-143. 1971. Illus. Map.
Identifiers: Ecology, Mountains, *Norway, Pisidium-casertanum, Pisidium-obtusale, *Sphaeriidae, *Oligotrophic lakes, Eutrophication.

Environmental conditions were studied in 4 lakes and 11 smaller water bodies in the Gol mountains in South Norway. Eight spp. of Sphaeriidae occurred. In the upper littoral zone of the 4 oligotrophic lakes, all poor in lime (total hardness = 0.2-1.2 dH, 1.5-10.5 mg CaO/l), 2-7 lime indifferent species were found. Favorable ecological factors in the lakes were loose sediments of dy or dygttja, pH-values above 6.4, and a low content of humus in the water (water color < 20 mg Pt/l). The smaller water bodies contained 0-2 spp. (Pisidium casertanum and/or P. obtusale). A tendency for drying up in the summer, and/or very acid humus-colored water characterized 4 localities with no Pisidium.--Copyright 1972, Biological Abstracts, Inc.
W73-00399

FERTILIZER EXPERIMENT IN THE RIVERIS RESERVOIR (DUNGEVERSUCHE AN DER RIVERISTALSPERRE),
Bonn Univ. (West Germany). Zoological Inst.
H. Schnitzler.
Hydrobiologia, Vol 39, No 3, p 383-404, March 1972. 9 fig, 10 tab, 8 ref.

Descriptors: *Phytoplankton, *Nutrients, Water pollution effects, Plankton, Chlorella, Scenedesmus, Biomass, Chlamydomonas, Phosphates, Nitrates, Reservoirs, Systematics, Chlorophyta, Nutrient requirements, Deficient elements, *Fertilizers.
Identifiers: *Riveris reservoir (FRG), Chlorella vulgaris, Scenedesmus bijugatus, Dinobryon sertularia, Gymnodinium lacustre, Tetraedron minimum, Uroglena volvox, Peridinium inconspicuum, Gymnodinium uberrimum, Synedra acus, Pedimonomas minutissima, Cryptomonas erosa, Aphanothece clathrata, Cyclotella stelligera, Chrysamoeba radians, Chroococcus dispersus, Kephyrion doliolum, Crucigenia tetrapedia, Germany, Dinobryon sociale var americanum, Massartia planata, Cryptomonas erosa var reflexa.

From March 1967 to October 1968 enrichment experiments with phosphate and nitrate were carried out in the Riveris reservoir near Trier (Fed. Rep. Germany). Plastic bags were filled with 70 liters of the reservoir water and placed into the lake after nitrate and phosphate were added. When only nitrate was added no propagation of the phytoplankton compared to the original water could be established. On the other hand, the phytoplankton propagated in those bags to which phosphate was added; in most cases an increase according to the amount of phosphate could be noticed. In only a few cases could an increase of plankton be seen when nitrate and phosphate were added. These results show that in the Riveris reservoir phosphate is a minimum factor for the phytoplankton. (Mortland-Battelle)
W73-00407

OXYGEN SUPERSATURATIONS IN THE CHUKCHI AND EAST SIBERIAN SEAS,
Washington Univ., Seattle. Dept. of Oceanography.
L. A. Codispoti, and F. A. Richards.
Deep-Sea Research, Vol 18, p 341-351, 1971. 5 fig, 5 tab, 18 ref.

Descriptors: *Dissolved oxygen, Water properties, *Photosynthesis, Oceans, Physical properties, Surface waters, Sampling, Supersaturation, Distribution patterns, Salinity, Stratification, Chemical reactions, Primary productivity, Mathematical models, Statistical methods, Bathymetry, Phosphorus, Nitrates, Silicates, Inorganic compounds, Eutrophication, Data collections, Gas chromatography, Sea water, Water pollution effects, Turbulence, Water temperature, Water quality.
Identifiers: *Bering Strait, *East Siberian Sea, *Chukchi Sea, Precision, Sample preparation, Pycnoclines, Winkler method, Oxygen supersaturation.

Dissolved oxygen was determined in water samples collected at various depths from the Chukchi and East Siberian Seas between the Bering Strait and approximately 170 degrees E. Unusually high oxygen concentrations, sometimes greater than 150 percent of saturation values, primarily arose from in situ photosynthetic production. The highest concentrations were observed in stratified waters that probably left the surface in winter when the water was nearly saturated with air and contained high nutrient concentrations. These oxygenated strata were generally separated from the surface by shallow pycnoclines. High oxygen concentrations were also observed in the relatively warm waters of the Bering Strait inflow. These high concentrations were presumably contributed to by the nutrient enrichment of the surface layers by turbulence. Comparing dissolved oxygen data obtained by the Winkler method to gas chromatographic analysis of samples yielded a 95 percent confidence limit (plus or minus 25) for the differences of minus 0.67 to plus 0.65 ml/l. (Long-Battelle)
W73-00411

PHYSICAL STATE IN WHICH NAPHTHALENE AND BIBENZYL ARE UTILIZED BY BACTERIA,
Ithaca Coll., N.Y. Dept. of Biology.
R. S. Wodzinski, and D. Bertolini.
Applied Microbiology, Vol 23, No 6, p 1077-1081, June 1972. 3 tab, 6 ref.

Descriptors: *Bacteria, *Organic compounds, *Growth rates, Pseudomonas, Cultures, Fermentation, Dissolved oxygen, Equipment, Soil bacteria, Microbiology, Microbial degradation, Nutrients.
Identifiers: *Naphthalene, *Bibenzyl, Gram-negative bacteria, Enrichment, Substrate utilization.

To determine whether bacteria obtain aromatic hydrocarbons from aqueous solution or from the solid phase, Pseudomonas and a gram-negative rod isolate obtained from soil were cultured in buffered mineral salts medium (BMS) containing naphthalene and bibenzyl, respectively. The cul-

tures were grown in a 500 ml, gas-tight fermentor in which dissolved oxygen was monitored with an oxygen probe. The results showed that generation times of a strain of Pseudomonas grown on a mineral salts medium in the presence of various amounts of naphthalene did not vary with the amount of solid present, and these generation times were the same as the generation time on mineral salts medium containing only dissolved naphthalene. The generation time of a soil isolate grown on mineral salts medium in the presence of 0.5 g of solid bibenzyl per liter was the same as the generation time on a mineral salts medium saturated with bibenzyl. The evidence indicates that naphthalene and bibenzyl are utilized in the dissolved state. (Snyder-Battelle)
W73-00417

MICROBIAL UTILIZATION OF CRUDE OIL,
Alberta Univ., Edmonton. Dept. of Microbiology.
A. Jobson, F. D. Cook, and D. W. S. Westlake.
Applied Microbiology, Vol 23, No 6, p 1082-1089, June 1972. 10 fig, 5 tab, 12 ref.

Descriptors: *Microorganisms, *Biodegradation, *Metabolism, *Soil bacteria, Bioassay, Pseudomonas, Bacillus, Temperature, Degradation (Decomposition), Chemical analysis, Cultures, Organic compounds, Growth rates, Emulsifiers, Canada, Data analysis, Sulfur, Aromatic compounds, Gas chromatography, Microbial degradation.
Identifiers: *Crude oil, Enrichment, Substrate utilization, Micrococous, Gas liquid chromatography, Oil residues, Mesophilic bacteria, Psychrophilic bacteria, Flavobacterium, Achromobacter, Asphaltenes.

The utilization of two crude oil samples of different quality at 4 and 30C has been studied by using pure and mixed bacterial cultures obtained by enrichment procedures. Growth, emulsification, and utilization occurred readily at both temperatures. The crude oil residue is increased in specific gravity and readily sediments out of solution. A comparison of the chemical analysis of the oils by liquid and gas-liquid chromatographic procedures before and after growth showed that the n-saturate fraction had been preferentially used, and utilization of the aromatic fraction occurred. Enrichments obtained with a high-quality crude oil were not as effective in utilizing a lower quality crude oil as sole carbon source as a population enriched on the low-quality crude oil. (Snyder-Battelle)
W73-00418

UPTAKE OF BACTERIOPHAGE AND THEIR SUBSEQUENT SURVIVAL IN EDIBLE WEST COAST CRABS AFTER PROCESSING,
Notre Dame Coll., Belmont, Calif. Dept. of Biology.
R. DiGirolamo, L. Wiczynski, M. Daley, F. Miranda, and C. Viehweger.
Applied Microbiology, Vol 23, No 6, p 1073-1076, June 1972. 2 fig, 1 tab, 12 ref.

Descriptors: *Crabs, *Viruses, *Bacteriophage, *Public health, *Water pollution effects, *Path of pollutants, Commercial shellfish, Crustaceans, Boiling, E. coli, Bioassay, Pollution, Foods.
Identifiers: Cancer magister, Cancer antennarius, Coliphage T4.

Edible West Coast crabs (Cancer magister and Cancer antennarius), when in seawater contaminated with coliphage T4, accumulate high titers of this virus. To study the extent of the hazard presented by crabs contaminated with virus, samples of edible crabs were contaminated with coliphage T4 and then processed by boiling. Results indicated that virus in crabs withstood this method of processing. The survival rate of virus varied from 2.5 to 20 percent, depending upon the processing time. Heat penetration studies showed that, although internal temperature in the crabs was sufficient to inactivate virus, the processing times normally used to cook crabs were not. These results suggest that processed crabs could serve as vectors for the dissemination of virus diseases if the crabs are harvested from a polluted area. (Snyder-Battelle)
W73-00419

EFFECTS OF PROLINE ANALOGUES ON THE FORMATION OF ALKALINE PHOSPHATASE IN ESCHERICHIA COLI,
Washington Univ., St. Louis, Mo. Dept. of Microbiology.
H. Morris, and M. J. Schlesinger.
Journal of Bacteriology, Vol 111, No 1, p 203-210, July 1972. 4 fig, 3 tab, 23 ref.

Descriptors: *E. coli, *Enzymes, Proteins, Growth rates, Biochemistry, Inhibition, Chemical analysis, Separation techniques, Amino acids, Pollutant identification.
Identifiers: *Proline, *Alkaline phosphatase, *Biosynthesis, *Metabolites, Gel electrophoresis, Antibodies, 4-allohydroxyproline, 4-thiazolidine carboxylate, Biochemical tests, Azetidine-2-carboxylate, 3 4-dehydroproline, cis-hydroxyproline, Polyacrylamide gel.

Two of the four proline analogues tested for their effect on the formation and activity of Escherichia coli alkaline phosphatase were able to substitute for proline in protein synthesis in a proline auxotroph. One of these, 3,4-dehydroproline, effectively replaced proline and led to formation of an active enzyme under conditions where no proline was present in the polypeptides. Substitution of azetidine-2-carboxylate for proline prevented active enzyme formation, producing instead altered monomeric forms of the alkaline phosphatase. These were detected with antibodies specific to denatured forms of the enzyme, and they were also characterized, together with cellular proteins, by sodium dodecyl sulfate-polyacrylamide gel electrophoresis. Alkaline phosphatase, as well as several other proteins, is localized exterior to the bacterial cell cytoplasm in the periplasmic space. In the presence of azetidine-2-carboxylate, a substantial number of these periplasmic proteins retain their specific site of localization, and the denatured subunits of alkaline phosphatase were only detected in the periplasmic fraction of the cell. Thus, secretion of these proteins does not appear to require a high degree of specificity in the native structure of the polypeptide chain. The analogues 4-allohydroxyproline and 4-thiazolidine carboxylate were unable to substitute for proline in protein synthesis but they inhibited growth of E. coli. (Snyder-Battelle)
W73-00420

ISOLATION AND TAXONOMIC SIGNIFICANCE OF BACTERIOPHAGES FOR NON--PROTEOLYTIC CLOSTRIDIUM BOTULINUM,
Wisconsin Univ., Madison. Dept. of Bacteriology.
For primary bibliographic entry see Field 05A.
W73-00421

WATER RELATIONS OF SALMONELLA ORANIENBURG: ACCUMULATION OF POTASSIUM AND AMINO ACIDS DURING RESPIRATION,
Commonwealth Scientific and Industrial Research Organization, North Ryde (Australia). Div. of Food Research.
J. H. B. Christian, and J. M. Hall.
Journal of General Microbiology, Vol 70, p 497-506, 1972. 9 fig, 9 ref.

Descriptors: *Salmonella, *Potassium, *Amino acids, *Respiration, Acids, Radioactivity techniques, Absorption, Photometry, Metabolism, Chromatography, Bioindicators, Oxidation, Growth rates, Nutrients, Filtration, Enteric bacteria, Pathogenic bacteria, Cultures.
Identifiers: Salmonella oranienburg, Water activity, Glucose oxidation, Proline, Aspartic acid, Glutamic acid, Alanine, Staphylococcus aureus, Liquid scintillation counting, Flame photometry, C-14, Culture media.

The influence of water activity on the rate and extent of potassium and amino acid uptake in Salmonella oranienburg and their relation to respiratory stimulation was studied. Amino acids giving high (proline), moderate (Aspartic acid), slight (glutami acid), and negligible (alanine) stimulation of glucose respiration were studied. Cultures were grown in brain-heart broth at 30C with shaking. Conventional Warburg equipment was used to measure oxygen consumption and in most cases potassium and amino acid accumulation. For potassium determinations, extracts from wet organisms and membrane filters were analyzed by flame photometry. Liquid scintillation counting was used for the assay of radioactive amino acids. Metabolism of proline was measured chromatographically. In the absence of amino acids, potassium accumulation increased to a maximum as A sub W (water activity) was decreased to about 0.975, but then dropped to a low value at 0.960 A sub w; with an amino acid, potassium accumulation was much increased and maximum uptake occurred at 0.960 A sub w. Carbon-14 proline uptake increased linearly with decrease in A sub w, the accumulated proline being metabolized in part to glutamic acid and to deaminated compounds. Uptake of aspartate was comparable to that of proline at A sub w down to 0.98 but then decreased. Relatively little exogenously supplied glutamate or alanine was accumulated at any water activity. (Mortland-Battelle)
W73-00423

DISTRIBUTION AND TAXONOMY OF LAMINARIA SINCLAIRII AND L. LONGIPES (PHAEOPHYCEAE, LAMINARIALES),
British Columbia Univ., Vancouver. Dept. of Botany.
For primary bibliographic entry see Field 05A.
W73-00428

PROCEDURES ADOPTED FOR THE LABORATORY CULTIVATION OF TRICHODESMIUM ERYTHRAEUM,
Centre for Advanced Study in Marine Biology, Porto Nova (India).
V. D. Ramamurthy.
Marine Biology, Vol 14, No 3, p 232-234, June 1972. 11 ref.

Descriptors: *Cultures, *Cyanophyta, *Marine algae, *Isolation, Marine plants, Eutrophication, Oceans, Sampling, Separation techniques, Cultivation, Vitamin B, Plant growth regulators, Nitrates, Phosphates, Nutrient requirements, Essential nutrients.
Identifiers: *Trichodesmium erythraeum, *Culturing techniques, Culture media, *Bay of Bengal, Indian Ocean, Soil extracts, Erdschreiber medium, Estuarine soils, Axenic cultures, Gibberelic acid.

Various culturing techniques were investigated for the axenic or pure cultivation of the marine bluegreen alga Trichodesmium erythraeum isolated a depth of 9-12 m in the Bay of Bengal during the pre-bloom period in March, 1965. Modified, enriched, Erdschreiber medium, containing a differential concentration of streptomycin, tetracycline, and sulfadiazine for inhibiting microbial growth, was used for cultivating the algae. Subcultures were formed every 7-9 days by inoculating fresh medium with 10-15 cells per 10 ml. The ingredients in the culture medium include: nitrate, phosphate, a 50 ml estuarine soil extract, seawater (3.3 percent salinity), Vitamin B12, gibberellic acid, and antibiotics. Instructions for the isolation of the algae and the preparation of the culture media are presented. (Long-Battelle)
W73-00430

PRIMARY PRODUCTION AT THE THERMOCLINE LEVEL IN THE NERITIC ZONE OF THE NORTH-OCCIDENTAL MEDITERRANEAN, (PRODUCTION PRIMAIRE AU NIVEAU DE LA THERMOCLINE EN ZONE NERITIQUE DE MEDITERRANEE NORD-OCCIDENTALE),
Arago Lab., Banyuls-sur-Mer (France).
G. Cahet, M. Fiala, G. Jacques, and M. Panouse.
Marine Biology, Vol 14, No 1, p 32-40, May 1972. 7 fig, 3 tab, 26 ref.

Descriptors: *Phytoplankton, *Thermocline, *Primary productivity, *Neritic, Nitrates, Radioactivity techniques, Eutrophication, Marine algae, Water pollution sources, Spatial distribution, Biomass, Photosynthesis, Nutrients, Limiting factors, Salinity, Carbon radioisotopes, Seston, Organic matter, Distribution patterns, Thermal properties, Thermal stratification, Chlorophyll, Magnesium compounds, Pigment, Surface waters, Sedimentation, Phosphates.
Identifiers: Nitzschia delicatissima, Nitzschia pungens, C-14, Chlorophyll a, Mediterranean Sea, France, Pycnocline.

Vertical profiles of physical, chemical and phytoplanktonic parameters are described, at the level of the thermocline, in the area of Banyuls-sur Mer, France. The results show that the thermocline divides two masses of water: (1) Mediterranean surface water with low nutrient concentrations and a salinity below 3.8 percent; (2) deep, nutrient-rich upwelled water (N-N03 greater than 3 microat-g/l, P-P04 greater than 0.3 microat-g/l, greater than 3.83 percent S), which comes from the upper limit of the Mediterranean intermediate water, usually located at the 200 m level. Consequently, conditions are suitable for high production rates at the bottom of the thermocline, where Chl a is above 0.5 mg/cu m; dominant species are Nitzschia delicatissim and N. pungens. A diagram is presented explaining the different effects of the pycnoclines on primary production: eutrophication at the pycnocline levels is the result of passive accumulation of phytoplankton and organic matter during sedimentation, and/or of reduced diffusion of nutrients from deep waters towards the surface. (Long-Battelle)
W73-00431

STEPHANODISCUS BINDERANUS (KUTZ.) KRIEGER OR MELOSIRA BINDERANA KUTZ. (BACILLARIOPHYTA, CENTRALES),
Bristol Univ. (England). Dept. of Botany.
F. E. Round.
Phycologia, Vol 11, No 2, p 109-116, June 1972. 27 fig, 22 ref.

Descriptors: *Diatoms, *Bioindicators, *Eutrophication, *Pollutant identification, *Lake Michigan, Chrysophyta, Aquatic algae, Electron microscopy, Photography, Water pollution effects, Water purification, *Systematics.
Identifiers: *Stephanodiscus binderanus, *Melosira binderana, Scanning electron microscopy, Transmission electron microscopy, Light microscopy.

The centric diatom which has been identified either as a species of Melosira C. A. Ag. or of Stephanodiscus C. G. Ehrenb is an indicator of increasing eutrophication in lakes, and is also responsible for serious problems in water purification plants. Water samples were obtained from Lake Michigan to determine the genus to which this species belongs. The algae were investigated by light, scanning, and transmission microscopy. This represents the first detailed study of this species and confirmed its position in Stephanodiscus. (Long-Battelle)
W73-00432

ON THE ROLE OF BIOLOGICAL FACTORS IN THE SEDIMENTATION OF IRON, MANGANESE AND COBALT AND IN THE FORMATION OF NODULES (IN RUSSIAN),
Akademiya Nauk SSSR, Moscow. Institut Biologii Vnutrennykh Vod.
Yu. I. Sorokin.
Okeanologiya, Vol 12, No 1, p 3-14, January/February 1972. 6 fig, 7 tab, 47 ref.

Descriptors: *Sedimentation, *Bottom sediments, *Iron, *Manganese, *Cobalt, Sediments, Oceans, Mollusks, Shellfish, Crustaceans, Methodology, Sea water, Alkalis (Bases), Trace elements, Water pollution effects, Radioactivity techniques, Marine bacteria, Marine animals, Phytoplankton, Path of pollutants.
Identifiers: Biological processes, *Ores, Vitamin B12, Assimilation, Fate of pollutants.

Biological processes taking part in recent ore formation on the ocean floor have been studied experimentally. The experiments with natural oceanic plankton based on the radioisotope methods have shown that iron is intensively consumed by phytoplankton in the light. Cobalt is assimilated by bacterioplankton to synthetize Vitamin B sub 12. Filter-feeding molluscs and crustaceans have appeared to be capable of filtering out highly diluted hydroxides. The studies of microflora on nodules show that bacterial life on the latter is more intensive than that in the surrounding sediment. No specific forms of iron and manganese oxidizing bacteria have been found on nodules. The obtained data are considered from the point of view of the role of the described biological factors in sedimentation and ore formation. (Long-Battelle)
W73-00433

LOCALIZATION OF OXIDATION OF N-PARAFFINS BY YEASTS,
Moskovakaya Selskokhozyaistvennaya Akademiya (USSR).
For primary bibliographic entry see Field 05B.
W73-00439

INTERREGULATION OF MARINE PLANKTONIC DIATOMS IN MONO-AND MIXED CULTURES, (IN RUSSIAN),
Moscow State Univ. (USSR).
V. D. Fedorov, and N. G. Kustenko.
Okeanologiya, Vol 12, No 1, p 111-122, January/February 1972. 10 fig, 2 tab, 14 ref.

Descriptors: *Diatoms, *Cultures, *Nutrient requirements, Sea water, Nitrates, Phosphorus, Nutrients, Chrysophyta, Competition, Water pollution sources, Pollutant identification, Phytoplankton, Marine algae, Essential nutrients.
Identifiers: *Interregulation, Skeletonema costatum, Thalassionema nitzschioides, Mixed cultures, Metabolites, Substrate utilization, Growth.

A method of nutrient salt additions is used in combination with the design of the full factor experiments to show the prevailing dependence of the growth of the algological pure culture of Skeletonema costatum on nitrate nitrogen concentrations and of Thalassionema nitzschioides on phosphorus concentrations. By varying the concentrations of these two elements in the nutrient medium (the sea water with nitrogen and phosphorus additions), as well as the sowing titer of each diatom species, the experimenters succeeded in changing the direction of the exclusion of some species by the competitive one when the species are cultivated together. The mechanism of the quantitative interregulation of both cultures is shown to be based on the activity of extracellular diatom metabolites the accumulation and action of which is very specific (i.e., connected with a certain stage of development) for each diatom. (Long-Battelle)
W73-00441

SEASONAL CHARACTERISTICS OF PHYTOPLANKTON IN THE AMURSKY BAY OF THE SEA OF JAPAN, (IN RUSSIAN),
Akademiya Nauk SSSR, Vladivostok. Institut Biologii.
G. V. Konovalova.
Okeanologiya, Vol 12, No 1, p 123-128, January/February 1972. 2 fig, 14 ref.

Descriptors: *Phytoplankton, *Environmental effects, *Systematics, *Seasonal, Sea water, Sampling, Biomass, Diatoms, Pollutant identification, Marine algae, Chrysophyta, Autumn, Winter, Summer, Primary productivity, Dinoflagellates, Pyrrophyta.
Identifiers: Sea of Japan, *Amursky Bay, Peridinians, Eucampia zoodiacus, Chaetoceros affinis, Skeletonema costatum, Chaetoceros socialis.

Seasonal number and biomass dynamics of the phytoplankton, as well as of its constituent systematic groups and mass species, were determined on the basis of the annual phytoplankton collections in the Amursky Bay of the Sea of Japan. The specific composition of algae was determined in the water-bottle collections. A major part of the biomass calculations was based on the table of volumes compiled for the mass phytoplankton species. Three maxima of algal biomass are established: in winter, summer and autumn. Diatoms play a leading role in the formation phytoplankton biomass and its numbers. Peridinians stand second in biomass. The greatest biomass was observed in Eucampia zoodiacus and Chaetoceros affinis, the greatest numbers in Skeletonema costatum, Chaetoceros affinis and Chaetoceros socialis. At all the stations the biomass maximum was recorded at the end of September and in October, whereas the minimum was in April. There were distinct changes of forms in the planktonic algae. (Long-Battelle)
W73-00442

SOME DATA ON THE QUANTITATIVE DISTRIBUTION AND FEEDING SIGNIFICANCE OF BENTHOS FROM THE SHELF WATERS OF WEST PAKISTAN, (IN RUSSIAN),
Azovo-Chernomorskii Nauchno-Issledovatelskii Institut Morskogo Rybnogo Khozyaistva i Okeanografii, Kerch (USSR).
For primary bibliographic entry see Field 05B.
W73-00444

AN ARGUMENT FOR THE OPEN OCEAN SITING OF COASTAL THERMAL ELECTRIC PLANTS,
National Marine Water Quality Lab., West Kingston, R. I.
C. M. Tarzwell.
J Environ Qual. Vol 1, No 1, p 89-91. 1972.
Identifiers: Coasts, Fish, Invertebrates, Ocean, Plankton, *Thermal pollution, *Electrical plant siting, Water pollution effects.

IT IS EVIDENT THAT THE CHLORINATION OF THE INTAKE WATER IS DEFINITELY LETHAL TO A HIGH PERCENTAGE OF PLANKTONIC AND OTHER ORGANISMS; THAT THERMAL SHOCK IS DETRIMENTAL TO SOME OF THE MORE SENSITIVE FORMS; THAT THE CONTINUED EXPOSURE TO HIGH TEMPERATURES AFTER THERMAL SHOCK IS LETHAL TO MANY FORMS, ESPECIALLY THE ZOOPLANKTON; THAT THE SCREENING AND TURBULENCE IN SUCH PLANTS IS LETHAL TO LARVAL FISHES AND SEVERAL INVERTEBRATES, AND THAT IMMENSE AMOUNTS OF WATERS ARE PUT THROUGH THE PLANT AND SUCH TRANSFER CAN BE DETRIMENTAL. In view of these findings, it is believed that in most instances bays and estuaries are not suitable for the location of a number of thermal electric plants. Discharges to the open ocean should be encouraged or required because acre for acre bays and estuarine waters are more

important and valuable for the production of marine life than is the open ocean. It is recommended, however, that each situation be examined as to all possible adverse effects, and that these plants be so located or corrective measures built in so that they cause the least amount of damage to the aquatic environment and the various water uses. If damage cannot be prevented, it is best to damage the least valuable area.--Copyright 1972, Biological Abstracts, Inc.
W73-00623

DISTRIBUTION AND ECOLOGICAL FEATURES OF HYDROPHYTES IN THE POLLUTED LAKE VANAJAVESI, S. FINLAND,
Helsinki Univ. (Finland). Dept. of Botany.
P. Uotila.
Ann Bot Fenn. Vol 8, No 3, p 257-295. 1971. Illus.
Identifiers: Distribution, Ecological patterns, *Finland, Flora, *Hydrophytes, Lakes, *Lake Vanajavesi, Water pollution effects.

The aquatic macroflora of the eutrophic Lake Vanajavesi (133 km2) was studied, special attention being paid to the ecology and distribution of the species. The results were compared with some earlier local investigations. Attention is paid to the effect on the flora of changes in the environment, i.e., the heavy pollution caused by municipal sewage and trade wastes, principally effluents from food-stuff factories, the regulation of the water level, the decrease of pasturing, and the increase of summer cottages and boat traffic.--Copyright 1972, Biological Abstracts, Inc.
W73-00631

STUDIES ON THE BENTHIC COMMUNITIES IN SHIMIZU HARBOR AND ORIDO BAY IN SUMMER (IN JAPANESE),
Tokai Univ., Tokyo (Japan). Coll. of Marine Science and Technology.
Masaya Kosaka, Masahiro Ogura, Kaoru Daimon, and Miyasita Kenichi.
J Coll Mar Sci Technol Tokai Univ. 5. p 9-25. 1971. English summary.
Identifiers: Bays, *Biomass, Benthic communities, Harbor, *Invertebrates, *Japan, *Orido Bay, *Shimizu harbor, Summer, Industrial wastes, Water pollution effects.

An analysis is made of the changes in the biomasses of invertebrate species of the benthic communities in Shimizu Harbor and Orido Bay as a result of organic pollution by industrial sewage.--Copyright 1972, Biological Abstracts, Inc.
W73-00632

BENTHIC COMMUNITY METABOLISM IN BAY QUINTE AND LAKE ONTARIO,
Guelph Univ. (Ontario). Dept. of Zoology.
M. G. Johnson, and R. O. Brinkhurst.
J Fish Res Board Can. Vol 28, No 11, p 1715-1725. 1971. Illus.
Identifiers: Bays, Benthic communities, Canada, Invertebrates, Lakes, *Metabolism, *Lake Ontario, *Bay Quinte, *Organic matter, Lake sediments.

Rates of sedimentation of organic matter to the bottom sediments at 4 stations (in order from the inner Bay of Quinte to open Lake Ontario) averaged 1.91, 0.42, 0.36, and 0.21 g m-2 day-1. Respective respiration rates of sediment cores averaged 0.35, 0.25, 0.22, and 0.15 g 02 m-2 day-1. Approximately 90% of imported energy (IM) was used by the benthic communities at the 3 lakeward stations and 23% at the inner bay station. Low utilization in the inner bay was substantiated by the high organic matter (28%) in sediments there, in contrast with Lake Ontario sediments (3-4%). Low utilization was attributed to the relatively greater proportion of allochthonous import. Only 2% of imported energy was assimilated by macroinvertebrates in the inner bay, in contrast with about 30% at the lakeward stations. A concise model of macroinvertebrate production, P = c (a.b IM) (where c is the proportion of growth to respired and exported energy and is derived from the average growth efficiency of macroinvertebrates, a is proportion of imported energy used by the total benthic community, and b is proportion of the latter used by macroinvertebrates), was used to deduce the relation between production and import. All of the parameters a, b, and c presumably decrease with increasing import, although c may be low initially at low import and sparse food supply.--Copyright 1972, Biological Abstracts, Inc.
W73-00633

PRODUCTION OF BENTHIC MACROINVERTEBRATES OF BAY OF QUINTE AND LAKE ONTARIO,
Guelph Univ. (Ontario). Dept. of Zoology.
M. G. Johnson, and R. O. Brinkhurst.
J Fish Res Board Can. Vol 28, No 11, p 1699-1714. 1971.
Identifiers: Bays, *Benthic invertebrates, Canada, Growth, Lakes, Mathematical model, *Lake Ontario, *Bay Quinte, Temperature, *Primary production.

Production rates (P) by benthic macroinvertebrates, obtained from data on instantaneous growth rate and biomass (B), ranged from 0.26 kcal/sq m/day at the inner bay station to 0.80 in the outer bay, 0.19 at the bay, mouth, 0.16 outside the Bay of Quinte, and 0.04 in the main basin of Lake Ontario. Respiration rates (R) of the common species were fitted to a general mathematical model. Growth efficiencies (production as a proportion of assimilation) declined progressively from about 0.65 at the inner bay station to 0.35 at the Lake Ontario station. Annual turnover ratios (P:B ratios) declined from 13 in the inner bay to about 1 in the deep sediments of Lake Ontario. Turnover ratio was correlated with the mean annual bottom temperature.
W73-00634

ASSOCIATIONS AND SPECIES DIVERSITY IN BENTHIC MACROINVERTEBRATES OF BAY OF QUINTE AND LAKE ONTARIO,
Guelph Univ. (Ontario). Dept. of Zoology.
M. G. Johnson, and R. O. Brinkhurst.
J Fish Res Board Can. Vol 28, No 11, p 1683-1697. 1971. Illus.
Identifiers: *Benthic invertebrates, Canada, *Chironomid, Crustaceans, Diversity, Lakes, Oligochaete, * Lake, Ontario, *Bay Quinte, *Species diversity, Sphaeriid, Vegetation, Bays.

Three main macroinvertebrate associations were found in the Bay of Quinte, Prince Edward Bay, and the adjacent area of Lake Ontario: a chironomid association of the eutrophic inner and middle bays; an association of many species of sphaeriids, oligochaetes, chironomids, and crustaceans in the mesotrophic lower Bay of Quinte and Prince Edward Bay; and a cold-stenotherm association of the oligotrophic deep basin of Lake Ontario. An additional, but more confined (inner Prince Edward Bay), association consisted of a variety of taxa, whose distribution appeared to be related to the distribution of vascular vegetation. All of the main taxonomic groups contributed to each association and to differences among associations. The lakeward progression of associations in the study area was closely similar to the west to east shifts in Lake Erie reported earlier. Species diversity in Lake Ontario associations apparently was related to degree of eutrophy and to water temperature.--Copyright 1972, Biological Abstracts, Inc.
W73-00635

5D. Waste Treatment Processes

PROPOSED SEWAGE FACILITIES, RICHLAND, WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, Seattle, Wash. Region X.

Available from the National Technical Information Service as PB-205 672-D, $3.00 in paper copy. January 11, 1972. 21 p, 1 illus, append.

Descriptors: *Washington, *Environmental effects, *Sewage disposal, *Sewage treatment, Facilities, Alternate planning, Sewers, Bypasses, Coordination, Sewage, Comprehensive planning, Adoption of practices, Salmon, Fish passages, Fish migration, Fish populations, Waste water treatment, Discharge (Water).
Identifiers: *Environmental Impact Statements, *Tri-Cities (Kennewick, Pasco, and Richland-Wash), Lift stations.

The project will involve modification of the existing Richland, Washington sewage treatment plant, installation of alarm reporting systems for all lift stations, and construction of a 21 inch gravity and 10 inch pressure sewer and lift station to serve the Badger Mountain area. The primary environmental impact will be with regard to the water regimen. The impact on existing land use will be minimal as the project is located generally and in a sparsely developed area. The most significant adverse environmental impact relates to the use of the Amon Wasteway as the receiving water for the pump station emergency bypass. The construction of the force main will disturb the river bottom during the construction period. In as much as such disturbance could be harmful to migrating salmon, it has been agreed that such construction would not be carried out during periods of salmon migration. Regionalization and alternatives of sewer and water alignment were considered. Included are problems and objections raised by federal, state, and local agencies, private organizations and individuals in the review process and disposition of the issues involved. (Widman-Florida)
W73-00044

CONSTRUCTION OF WASTEWATER FACILITIES, AUSTIN, TEXAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, Dallas, Tex. Air and Water Programs.

Available from the National Technical Information Service as PB-206 401-D, $3.00 in paper copy. February 4, 1972. 99 p, 9 fig, 1 map, 8 tab.

Descriptors: *Texas, *Environmental effects, *Waste water treatment, *Water quality control, Municipal wastes, Industrial wastes, Colorado River Basin, Waste water disposal, Water demand, Land use, Sludge disposal, Project planning, Community development, City planning, Treatment facilities, Sewers, Sewage disposal, Sewage effluents, Water pollution sources, Water pollution control.
Identifiers: *Environmental Impact Statements, *Austin (Tex).

The project consists of the construction of a deep tunnel interceptor and the enlargement of an existing waste water treatment plant for the City of Austin, Texas. The project will relieve overloaded trunk sewers tributary to the Govalle Wastewater Treatment Plant and will reduce peak flows to the plant. Additional treatment capacity will be available to permit additional service to the undeveloped Govalle Treatment Plant sewer area. Adverse effects on the environment due to the project are considered minimal. The expanded treatment facilities will be constructed at the existing plant

site; however, treatment requirements necessitate the conversion of this site to a more permanent type of treatment plant, thus the land will be unavailable for other land uses. Alternatives to the proposed project are: different locations for the treatment plant, different locations for the interceptor, various other treatment processes, and various means of sludge disposal. (Waldron-Florida)
W73-00056

EQUALIZATION OF WASTEWATER FLOWS,
O'Brien and Gere Engineers, Inc., Syracuse, N.Y.
M. D. LaGrega.
Available from the National Technical Information Service as PB-212 389, $3.00 in paper copy, $0.95 in microfiche. Environmental Protection Agency Report EPA-R2-72-075, March 1972, 47 p, 9 fig, 10 tab, 107 ref. EPA Project 317090 EEV. Contract 14-12-598.

Descriptors: *Sewage treatment, Water pollution control, *Treatment facilities, On-site investigations, *Design criteria, Statistical models, Time series analysis, Waste water treatment, Model studies.
Identifiers: *Flow equalization, Flow forecasting, Plant efficiency, *Newark (NY).

The diurnal variability of waste flow and waste strength entering waste water treatment facilities has important ramifications in the design and operation of both conventional and advanced waste treatment plants. Results are presented of a full scale (2 mgd) study of the effects of maintaining a constant flow of waste water into a sewage treatment plant through the use of an equalization tank. The study was conducted at the Newark, New York Water Pollution Control Facilities during 1970-71. These facilities were modified to permit operation of the plant under either constant or variable flow. (EPA)
W73-00066

ELECTRIC POWER GENERATION WITH DRY--TYPE COOLING SYSTEMS,
Beck (R. W.) and Associates, Denver, Colo.
J. P. Rossie, E. A. Cecil, P. R. Cunningham, and C. J. Steiert.
Proceedings of the American Power Conference, Vol 33, p 524-534, 1971. 4 fig, 2 tab, 1 ref.

Descriptors: *Comparative costs, *Cost-benefit analysis, *Cooling towers, *Powerplants, Comparative benefits, Heat, Thermal powerplants, Turbines, Economic justification, Air temperature, Capital costs, Costs.
Identifiers: *Dry-type cooling towers, *Bus-bar costs, Evaporative cooling towers, Heat rates, Fuel costs.

Power production costs for dry-type and evaporative-type cooling systems are compared. The following savings accomplished with a dry cooling system are stressed: possible fuel cost savings as a result of the greater flexibility of plant location with a dry-type cooling system, possible transmission cost savings as a result of greater flexibility of plant location, possible savings as a result of the economies of an additional unit at an existing facility where inadequate water supply would otherwise rule out the addition, possible savings in cooling water makeup when compared with an evaporative-type cooling tower plant. For a cooling water makeup of $100 per acre-foot (approximately 31 cents/10 gal), the water savings for a dry tower installation would approximate 0.2 mills/kWh. (Oleszkiewicz-Vanderbilt)
W73-00068

ULTRASONIC FILTRATION OF COMBINED SEWER OVERFLOWS.
American Process Equipment Corp., Hawthorne, Calif.
Available from GPO Sup Doc as SN 5501-0071, $0.60; microfiche from NTIS as PB-212 421, $0.95. Environmental Protection Agency, Water Pollution Control Research Series, June 1970, 49 p, 13 fig. EPA Program 11023 DZF 06/70.

Descriptors: *Suspended solids, *Biochemical oxygen demand, *Filtration, Ultrasonics, Sewage, Water pollution, *Waste water treatment.
Identifiers: *Ultrasonic filtration, *Combined sewer overflows, Vortex separator, Polyethylene.

Simulated combined sewer overflows and primary treatment plant effluent were used to test a 250,000 gpd compact ultrasonically cleaned microfiltration system composed of twenty porous polyethylene elements of 0.8 sq. ft. area each. Study indicates that the use of more constly porous stainless steel elements would alleviate the clogging of filters. Filter clogging at the Atlanta, Georgia test site prevented showing the feasibility of treating combined sewer overflows. In more suitable water pollution control applications, it is possible to reduce BOD and suspended solids in raw settled sewage, or effluents from primary and secondary plants by 50%, using ultrasonic filtration and having initial levels of influent BOD and suspended solids of 100 mg/l or less. A vortex separator was designed as a pretreatment device for the filter. (Smith-Texas)
W73-00070

MAXIMUM UTILIZATION OF CALAVERAS COOLING LAKE FOR ELECTRIC GENERATION,
San Antonio City Public Service Board, Tex.
C. G. Krause, and R. D. Woodson.
Proceedings of the American Power Conference, Vol 31, p 744-753, 1969. 6 fig, 4 tab, 2 ref.

Descriptors: *Thermal powerplants, *Optimization, *Cooling, Lakes, Heat budget, *Thermal pollution, Planning, Outlets, Sites, Temperature, Electric power production, Recreation, Public benefits.
Identifiers: *Calaveras Cooling Lake, *Cooling lake, Lake cooling circuits, Cooling capability, Impact area, Site selection, Baffling, San Antonio.

Specially constructed cooling lakes for large thermal electric generating stations are more frequently being considered and in many cases will be the most advantageous means of heat dissipation and cooling water storage. Since large investment costs for cooling lakes are involved, it is necessary to design such facilities to obtain maximum overall economy of electric generation. Optimum lake cooling performance results from effective use of the lake surface area and the temperature flywheel effect of the large volume of water stored in the lake. Final lake area or lake elevation can then be optimized to provide the most economical inlet water temperatures to the condenser. The principles of this optimization are presented on the basis of Calaveras Cooling Lake for San Antonio's new powerplant. (Oleszkiewicz-Vanderbilt)
W73-00076

PLANTS SHOW PROGRESS IN POLLUTION CONTROL,
R. S. Schwieger.
Power, p 27-32, April 1970. 3 fig, 9 tab, 10 ref.

Descriptors: *Nuclear powerplants, *Heated water, Water pollution sources, *Air pollution, Comparative costs, Heat, Thermal powerplants, Cooling, Cooling towers, Capital costs, Costs, Economic justification, Fossil fuels, Coals, Air pollution effects, Sulfur compounds, *Pollution abatement, Gases, Nitrogen compounds, *Thermal pollution.

Power generation causes two basic types of environmental pollution: air pollution and water pollution. Burning of fossil fuels produces particulates and gases. The health hazard of particulates is described and methods of controlling particulate emissions are discussed. Effects of sulfur oxides, methods of preventing their production, and methods of removing them are discussed in more detail. They are considered the major pollution problem in combustion of fossil fuels in power plants. Radioactive emissions to the air from coal fired plants and nuclear stations are compared. The problem of necessary and costly cooling of thermal discharge in water is discussed presenting a brief capital and operating cost outline for different cooling systems. The trends in AEC sponsored research are toward temperature prediction, heat dissipation, siting, biological effects, and beneficial uses of heated water. (Oleszkiewicz-Vanderbilt)
W73-00077

COOLING WATER TREATMENT IN POWER PLANTS,
Oak Ridge National Lab., Tenn.
W. L. Marshall.
Industrial Water Engineering, Vol 9, No 2, p 38-42, February-March 1972. 1 fig.

Descriptors: *Cooling water, *Water treatment, *Thermal powerplants, Electric power production, Water softening, Powerplants, Cooling, Water pollution, Efficiencies, Physicochemical parameters, Water quality, Condensers, Boilers, Heated water, Boiler feed water, Nuclear powerplants, Radioactive wastes, Reactors, Evaporation, Cooling towers, Coolants.
Identifiers: *Cooling water treatment, Once-through cooling, Closed-cycle cooling.

The current practices in chemically treating natural waters for use as coolants are discussed in relation to the ultimate discharge of these chemicals to the environment. All types of thermal power plants are considered, including dual-purpose plants that also desalinate water. Contents of pollutants in effluents from once-thru cooling systems and recirculating systems are compared. For example the recirculating tower discharge may contain up to 10,000 ppm of total dissolved solids (TDS) while in an expensive once-thru cooling tower effluent the TDS content would usually be about 500 to 600 ppm. (Oleszkiewicz-Vanderbilt)
W73-00078

THE IMPACT OF OILY MATERIAL ON ACTIVATED SLUDGE SYSTEMS.
Hydroscience, Inc., Westwood, N.J.

Copy available from GPO Sup Doc as SN5501-0088, $1.25; microfiche from NTIS as PB-212 422, $0.95. Environmental Protection Agency, Water Pollution Control Research Series, March 1971, 110 p, 29 fig, 10 tab, 38 ref. EPA Program 12050 DSH 03/71.

Descriptors: *Oil wastes, *Activated sludge, *Sewage treatment, *Waste water disposal, Biological treatment, Oil, Biodegradation, Absorption, Sludge treatment.
Identifiers: *Spent crankcase oil, *Vegetable oil, *Crude oil, Refinery waste oil, Load tolerance.

The preformance of small scale continuous activated sludge systems was observed after being exposed to a variety of oily compounds such as crankcase oil, crude oil and vegetable oil, at several loading levels. Batch studies were conducted to determine biodegradability and the effect of emulsification and temperature on the rate of biological reaction. Oils are absorbed on the floc and slowly degrade when they are introduced into an activated sludge system. The oil accumulates on the sludge causing a loss of density and acceptable settling characteristics if the loading rate is higher than the degradation wastage. The ability of the microbial system to remove other substrates is not inhibited although the biological system fails

due to the loss of sludge. 0.10 pounds per day per pound of sludge under aeration should be the maximum continuous feed level of oils to activated sludge. Shock loads should not exceed 5% of the weight of the sludge under aeration. (Smith-Texas)
W73-00081

THE MECHANISM OF WASTE TREATMENT AT LOW TEMPERATURE, PART A. MICROBIOLOGY,
Colorado State Univ., Fort Collins. Environmental Resources Center.
S. M. Morrison, G. C. Newton, G. D. Boone, and K. L. Martin.
Available from the National Technical Information Service as PB-212 571, $3.00 in paper copy, $0.95 in microfiche. Colorado Environmental Resources Center, Ft. Collins, Completion Report Series No 33, August 1972. 100 p, 26 fig, 23 tab, 101 ref, appnd. OWRR A 007 Colo (1).

Descriptors: Waste treatment, *Sewage treatment, Water treatment, *Bacteria, *Sewage bacteria, *Waste water treatment, Treatment facilities, *Oxidation, Biochemical oxygen demand.
Identifiers: *Psychrophiles, Waste degredation, Temperature effects, *Low temperature, *Biological oxidation.

Low temperatures adversely affect wastewater treatment efficiency by decreasing rates of biological oxidation. Because of the importance of adequate treatment efficiency, the feasibility of inoculating psychrophiles into a wastewater treatment system to increase biological oxidation rates at low temperatures was investigated. Three psychrophiles capable of relatively rapid growth or oxygen uptake in sterilized sewage were selected from water and soil isolates as well as three of 97 Alaskan isolates were selected for study. With heat sterilized sewage the effects of cell numbers and temperature were the most significant while organism growth type and culture age were also significant. At 15 and 20 C, the psychrophile inocula removed less BOD than mesophiles, but at 5 and 10 C the psychrophiles were more efficient. The 1-day old cells generally removed more percent BOD than 7-day cells. Using raw settled sewage as substrate at 5 C, the Alaskan psychrophiles removed substantially more BOD within a 72 hr detention period than untreated controls; however, within a 120 hr period, BOD removals never averaged greater than 31.3%. These observations add to our knowledge concerning biological treatment as a method of wastewater stabilization; however, the system investigated appears to be too inefficient for practical use, even though it showed a statistically significant advantage over untreated or mesophilic inoculated controls. (See also W73-00140)
W73-00139

THE MECHANISM OF WATER TREATMENT AT LOW TEMPERATURE, PART B, SANITARY ENGINEERING,
Colorado State Univ., Fort Collins. Environmental Resources Center.
J. C. Ward, J. S. Hunter, and R. P. Johansen.
Available from the National Technical Information Service as PB-212 572, $3.00 in paper copy, $0.95 in microfiche. Colorado Environmental Resources Center, Ft. Collins, Completion Report Series No 34, August 1972. 70 p, 18 fig, 22 tab, 24 ref, 5 append. OWRR A 007 Colorado (Z). 14-31-0001-3506.

Descriptors: *Aeration, *Water temperature, *Altitude, *Oxygen, Dissolved oxygen, Chemical oxygen demand, Biochemical oxygen demand.
Identifiers: *Oxygen transfer, *Low water temperature, *High elevation, *Oxygen aeration, *Mechanical aeration, Atmospheric pressure, Air temperature.

Part 1 (The Effects of Water Temperature and Elevation upon Aeration): A laboratory-scale mechanical aeration system was used to examine the variation in oxygen transfer rates into water as a function of water temperature (0 to 40 degree C). The overall volumetric mass transfer coefficient, liquid phase base, increased linearly with water temperature at a rate of 2.84% per deg. C. The relative aeration efficiency decreases with increasing elevation, water temperature, and dissolved oxygen concentration. For zero dissolved oxygen and elevation, the rate of oxygen transfer per unit volume and time is independent of water temperature for 0 to 60 C. Equations were developed relating saturation dissolved oxygen concentration to temperature and atmospheric pressure to elevation and air temperature. Part 2 (BOD and COD Removal from Wastewater by Aeration with Air and Oxygen): Both air and oxygen were used under identical conditions to determine the effect (if any) of dissolved oxygen concentration on the rate of oxygen demand removal. At 20 C, the rate of oxygen demand removal was independent of the dissolved oxygen concentration over the range 3.4 to 32 mg/l. The use of oxygen in an enclosed contact-stabilization activated sludge wastewater treatment plant suitable for high altitudes and latitudes is shown. (See also W73-00139)
W73-00140

EXISTING AUTOMATION, CONTROL AND INTELLIGENCE SYSTEMS FOR METROPOLITAN WATER FACILITIES,
H. G. Poertner.
Colorado State University, Ft. Collins, Dept of Civil Eng, Technical Report No 1, January 1972. 142 p, 1 tab, 3 append, 2 exhibits. OWRR C-2207 (No 3410) (1). 14-31-0001-3410.

Descriptors: *Instrumentation, *Automatic control, *Supervisory control, *Automation, *Remote control, Electronic equipment, Control systems, Digital computers, Monitoring, Telemetry, Data transmission, Distribution systems, Water supply, Water treatment, Waste water treatment, Sewers, Waste water disposal, Water quality control, Hydrologic data, Data processing, Urbanization, Cities.
Identifiers: *Intelligence systems, *Combined sewer systems, Pollution control.

A survey was made of existing and planned applications of instrumentation in water and wastewater systems of selected urban and metropolitan areas of the United States. The basic goal was to make available information concerning instrumentation and automation that would be useful to decision-makers in providing and operating such systems. Summaries are included on specific applications of monitoring, data logging and analysis, data processing and reduction, conventional supervisory control, automation, and computer control of operations. The various systems are water supply, water treatment, wastewater and stormwater collection, wastewater treatment and disposal, water quality monitoring, and hydrologic data collection. (See W73-00146 thru W73-00154)
W73-00145

COMPUTER AND CONTROL EQUIPMENT.
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.

Available from the National Technical Information Service as PB-212 569, $3.00 in paper copy, $0.95 in microfiche. Colorado State University, Ft. Collins, Dept of Civil Eng, Technical Report No 2, December 1971. 40 p, 5 ref, 2 append. OWRR C-2207 (2). 14-31-0001-3410.

Descriptors: *Computers, *Computer models, *Computer programs, Data collections, Decision making, Data transmission, Automation, Control, Information retrieval, Data processing.
Identifiers: *Intelligence systems, *Real time automation control systems, *Real time automation control system models, Pollution control, Combined sewer drainage systems.

The use of digital computers for the centralized monitoring and control of various operations is gaining acceptance in a number of fields. Under such a centralized supervisory system, all important performance variables are transmitted, or telemetered, to a central location where they are logged, displayed, and manipulated as may be required to achieve the desired operations. The initial automation effort is usually substantial, being somewhat dependent on the project scope. The selection of computer and associated peripheral equipment for such an effort is of significant importance. Basic information concerning computers and associated peripheral equipment that should be of use to management level personnel is presented. A concise glossary of commonly encountered computer terms, and the characteristics of a number of commonly used mini-computers is also included. (See also W73-00145)
W73-00146

CONTROL OF COMBINED SEWER OVERFLOWS IN MINNEAPOLIS-SAINT PAUL,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
L. S. Tucker.
Technical Report No. 3, October 1971. 47 p, 12 fig, 1 tab, 25 ref, 2 append.. OWRR C-2207 (3). 14-31-0001-3410.

Descriptors: *Automatic control, *Sewage districts, *Sewage, *Sewage treatment, *Water pollution control, *Control systems, *Remote control, *Monitoring, Pollution abatement, Water quality control, Water management (Applied), Instrumentation, Data transmission, Digital computers, Distribution systems, Water quality control, Hydrologic data, Electronic equipment, Urbanization, Cities.
Identifiers: *Metropolitan water intelligence systems, *Minneapolis-Saint Paul, Detroit, Seattle, Combined sewer systems, Demonstration projects.

A thorough study was made of the implementation of a computer based sewer control system in Minneapolis-Saint Paul. The system, partially supported by the Environmental Protection Agency, has the objective of maximizing in-system storage to control overflows. In addition to describing the demonstration project, an analysis was made of the Minneapolis-Saint Paul regional water quality objectives and institutional arrangements, as well as local combined sewer collection systems, and nontechnical factors involved in the use of computer-based control systems in the Minneapolis-Saint Paul region. (See also W73-00145)
W73-00147

TASK 3 - AN INVESTIGATION OF THE EVALUATION OF AUTOMATION AND CONTROL SCHEMES FOR COMBINED SEWER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
J. J. Anderson, R. L. Callery, and D. J. Anderson.
Available from the National Technical Information Service as PB-212 573, $3.00 in paper copy, $0.95 in microfiche. Colorado State University, Ft. Collins, Dept of Civil Eng, Technical Report No. 4, January 1972. 48 p, 4 fig, 4 tab, 54 ref, 1 append. OWRR C-2207 (4). 14-31-0001-3410.

Descriptors: *Control systems, *City planning, *Engineering, Evaluation, *Economic justification, Management, Operations research, Economic feasibility, Analytical techniques, Cities.
Identifiers: *Metropolitan water intelligence systems, *Combined sewer systems, Evaluation methods, Users needs.

The need for a method to evaluate the applicability and potential effectiveness of urban water resource systems and in particular combined sewer control systems is established by: a) a discussion of its importance as an interface between the public works manager and urban water subsystems using automation and control; b) the presentation by a flow chart of the decision making process which determines whether all or part of a combined sewer system should be automated, and c) identification of the vital information needed by the user relative to the adoption and implementation of automation and control schemes for combined sewers. (See also W73-00145)
W73-00148

SOCIAL AND POLITICAL FEASIBILITY OF AUTOMATED URBAN WATER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
D. W. Hill, and L. S. Tucker.
Available from the National Technical Information Service as PB-212 574, $3.00 in paper copy, $0.95 in microfiche. Colorado State University, Ft. Collins, Dept of Civil Eng, Technical Report No. 5, January 1972. 63 p, 4 fig. OWRR C-2207 (5) 14-31-0001-3410.

Descriptors: *Social function, *Behavior, *Automatic control, *Decision making, *Political constraints, *Urbanization, *City planning, *Water supply systems, Urban sociology, Organizations, Social aspects, Social impact, Social needs, Legal aspects, Institutions, Jurisdiction, Legislation, Water resources development, Water quality, Water pollution control, Social adjustment.
Identifiers: *Metropolitan water intelligence systems, *Combined sewer systems.

Social and political feasibility and the constraints associated with implementation and operation of control systems is explored. The need for sound analysis of technical and economic feasibility is not negated, but the necessity of the consideration of nontechnical factors is emphasized. Some nontechnical constraints to project implementation and operation are identified including: a) social choice, b) feasibility, c) performance failures and low visibility, d) communication failures, e) planning and implementation failures, f) crisis and crash programming, and g) low skill and financial supports. These constraints are discussed in terms of their potential effects and possible remedies. (See also W73-00145)
W73-00149

URBAN SIZE AND ITS RELATION TO NEED FOR AUTOMATION AND CONTROL,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
B. H. Bradford, and D. C. Taylor.
Available from the National Technical Information Service as PB-212 523, $3.00 in paper copy, $0.95 in microfiche. Technical Report No 6, February 1972. 8 p, 2 tab. OWRR C-2207 (6). 14-31-0001-3410.

Descriptors: *Automation, *Automatic control, *Urbanization, *Cities, Storm drains, Water resources, Management, City planning, Drainage systems, Urban renewal, Control systems, Systems engineering, Systems analysis, Sewers, Storm drains.
Identifiers: *Metropolitan water intelligence systems, *Combined sewer systems.

The urban parameters of 60 cities are examined in light of their relationship to the need or desire for urban water intelligence systems. A careful review of the economics and feasibility of an automated system as well as alternative systems is stressed for each situation. Incentives for automation alternatives to an intelligence system and factors which affect the choice of alternatives are identified. (See also W73-00145)
W73-00150

MODEL OF REAL-TIME AUTOMATION AND CONTROL SYSTEMS FOR COMBINED SEWERS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
W. Bell, B. Winn, and G. L. Smith.
Available from the National Technical Information Service as PB-212 575, $3.00 in paper copy, $0.95 in microfiche. Technical Report No. 7, February 1972. 78 p, 17 fig, 8 tab, 4 ref, 4 append. OWRR C-2207 (7). 14-31-0001-3410.

Descriptors: *Model studies, *Automation, *Sewers, Automatic control, Control systems, Drainage systems, Overflow, Backwater, Hydrologic models, Analytical techniques, Theoretical analysis, Computer models, Computers, Distribution systems.
Identifiers: *Metropolitan water intelligence systems, *Combined sewer systems, *Optimal control.

A simple Real-Time Automation and Control System (RTACS) Model, when completed, can be used as a tool to optimize the design of a prototype sewer system whose basic components would include: a physical system, sensing elements, control program, and control elements. The RTACS Model was formulated using the combined sewer system model developed for FWQA. A modified version of this model was used both to represent the physical system - including the generation and routing of runoff through the sewer system - and to generate runoff data for the control algorithm which employs optimal control theory. To demonstrate the applicability of the RTACS Model, control logic was developed in detail for a reasonable control objective and assumed physical drainage system served by a single main conduit with one lateral line. The operation of the drainage system was simulated by three reservoirs. Main line flow was simulated by two reservoirs operating in series. Combined flow was simulated by the single reservoir on the lateral acting in parallel with the main line flow at the junction point of the two pipe lines. The model is under further development and later reports will be issued. (See also W73-00145)
W73-00151

GUIDELINES FOR THE CONSIDERATION OF AUTOMATION AND CONTROL SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
L. S. Tucker, and D. W. Hill.
Available from the National Technical Information Service as PB-212 576, $3.00 in paper copy, $0.95 in microfiche. Technical Report No. 8, February 1972. 76 p, 3 tab, 10 fig. OWRR C-2207 (8). 14-31-0001-3410.

Descriptors: *Automation, *Control systems, *Municipal wastes, *Pollution abatement, Xtorm runoff, Sewers, Drainage systems, Systems engineering, Decision making, Water pollution sources, Sanitary engineering, Water pollution control, Automatic control.
Identifiers: *Metropolitan water intelligence systems, *Combined sewer systems, *Minneapolis-Saint Paul, *Seattle, *San Francisco, *Detroit.

Policy makers and managers are forced to deal with increasingly complex problems related to combined sewer systems. Alternatives for the solution of this complex water problem are needed. The alternative considered in detail is computer based control of combined sewer flow. The possibilities for control of separated systems are implied. Computer based control is but one of several recognized solutions. Its potential relative to other alternatives for reducing overflows is dependent on each particular situation and must be determined in a systematic evaluation process. The reduction or elimination of overflow is the major problem or objective. A source of motivation for achieving such an objective is the enactment of water quality policy and standards by the Federal and state governments. These policies and standards require solutions for reducing overflows by an amount that will allow systems to meet standards. Efforts by the municipalities of metropolitan Seattle, Detroit, Minneapolis-Saint Paul and San Francisco are examined in detail. On the basis of these studies, the potential advantages and disadvantages of computer based supervisory or automatic control of combined sewer systems are discussed. (See also W73-00145)
W73-00152

RESEARCH AND DEVELOPMENT NEEDS FOR METROPOLITAN WATER INTELLIGENCE SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
H. G. Poertner.
Available from the National Technical Information Service as PB-212 577, $3.00 in paper copy, $0.95 in microfiche. Colorado State University, Ft. Collins, Dept. of Civil Eng, Technical Report No. 9, February 1972. 12 p, 23 ref. OWRR C-2207 (9). 14-31-0001-3410.

Descriptors: *Research and development, *Water requirements, *Water resources development, *Urbanization, *Cities, *Automatic control, *Supervisory control, *Water quality control, *Instrumentation, *Automation, Digital computers, Water supply, Waste water treatment, Electronic equipment, Monitoring, Research needs.
Identifiers: *Metropolitan water intelligence systems, *Combined sewer systems.

A survey was made of existing and planned applications of instrumentation in water and wastewater systems of selected urban and metropolitan areas of the United States. The basic goal was to make available information concerning instrumentation and automation that would be useful to decision-makers in providing and operating such systems. The problems of planning, designing, implementing, maintaining, operating and financing instrumented water and wastewater systems are reported. Two major technical problems were identified -- the unreliability of telephone lines as a communications link between the field and the operations control center, and the excessive costs and manpower required to service and calibrate sensors used to measure water parameters. The major nontechnical problems highlighted the need for focusing attention on determining how metropolitan areas will use and handle water in future years, and educating and motivating public officials to investigare, encourage and support sophisticated metropolitan water intelligence systems. R and D needs are identified and classified under technical and non-technical areas for further investigation. (See also W73-00145)
W73-00153

METROPOLITAN WATER INTELLIGENCE SYSTEM, COMPLETION REPORT. PHASE I.
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
G. L. Smith, N. S. Grigg, L. S. Tucker, and D. Hill.
Available from the National Technical Information Service as PB-212 529, $3.00 in paper copy, $0.95 in microfiche. Completion Report, June 1972. 84 p, 5 fig, 2 tab. OWRR C-2207 (No 3410) (10).

Descriptors: *Systems engineering, *Water resources, Management, *Planning, *Combined sewers, *Pollution control, Decision making, Model studies, Systems analysis, Reliability, Sanitary engineering, Water pollution, Networks, Optimization, Management, Automatic control, Drainage systems, Overflow, Sewerage.
Identifiers: Minneapolis-St. Paul Sanitary District, Municipality of Metropolitan Seattle (Wash.), Detroit Metropolitan Water Services, San Francisco Master Plan for Waste Water Management.

The Metropolitan Water Intelligence System (M-WIS) Concept is being developed with the objective of providing automatic operational control for metropolitan water systems. The initial study was an investigation into the specific problem of controlling overflows from combined sewer systems in order to reduce this source of receiving water pollution. The technical and nontechnical aspects of the problem discussed include: the initiation of a Real-Time Automation and Control System (R-TACS) by means of a simulation model for use in the design of the components of the RTACS, the initial criteria for use in the development and operation of an RTACS, and the technical and nontechnical feasibility of an RTACS for combined sewer systems and possible further application to overall urban water systems. A summary is made of techaical reports which include: an inventory of existing automation, control and intelligence systems; guidelines for selection of computer and control equipment for MWIS; a field study of an actual control system serving Minneapolis-St. Paul Sewer District; a social and political feasibility analysis of the implementation of an MWIS; the development of a simplified RTACS model; guidelines on the role of an MWIS in city planning; and an analysis of the effect of urban size on research and development needs. (See also W73-00145)
W73-00154

ACTIVATED SLUDGE JOINT TREATMENT OF PULP AND PAPER EFFLUENT WITH MUNICIPAL SEWAGE,
Hammermill Paper Co., Erie, Pa. Pulping Research.
A. Brosig, Jr., D. G. Kirk, A. F. Lisanti, and W. Zabban.
Tappi, Vol 54, No 3, March 1971, p 386-390, 1 fig, 6 tab, 5 ref.

Descriptors: *Pulp wastes, *Chemical wastes, *Industrial wastes, Municipal wastes, Effluents, Biochemical oxygen demand, *Waste water treatment, *Activated sludge, Disinfection, Lake Erie, Pollution.
Identifiers: *Semichemical pulp wastes, *Combined treatment.

Joint industrial-municipal treatment of waste from an integrated fully bleached semichemical pulp and fine paper mill consisting of spent cooking liquor, a high-concentration bleach waste, and primary treated paper mill effluent was investigated. Results showed that primary tanks designed at 1100- (gal/sq ft)/day overflow rates would remove 60% of the SS and 20% of BOD. Aeration times of 9 hr. based on raw wastes flow would provide 90% BOD removal and prevent severe sludge bulking. Further studies showed that the volume of waste requiring municipal treatment would be reduced by two thirds if there was conversion to a full chemical pulping process with chemical recovery. Aeration time, final tank overflow rate, and sludge-handling equipment sizes, would be reduced by as much as one half. Low chlorine demands would allow normal disinfection practice with the remaining effluent, a low-concentration bleach waste, being neutralized and discharged into deep water through a diffuser pipe. (Smith-Texas)
W73-00155

RAINWATER DILUTION OF PROCESS WASTES,
Badger Co., Inc., Cambridge, Mass.
C. W. Moores.
Petro/Chem Engineer, Vol 43, No 4, p 39-40, April 1971, 2 fig.

Descriptors: *Rainfall, *Storm runoff, *Sewers, Storage tanks, Waste water treatment, Cost analysis, Water quality control.
Identifiers: *Rainwater dilution, Process wastes.

A contaminated water impounding-tank concept is proposed, whereby an overflow arrangement separates the relatively large volume of essentially uncontaminated rainwater from the smaller volume of grossly contaminated runoff. Although this concept is not the ultimate answer to aqueous waste treatment, it does provide capital cost savings and frees the design engineer from resorting to guesswork in choosing a 'design' storm when pumping and impounding facilities are being sized. (Smith-Texas)
W73-00156

GO ON-LINE; IT'S VITAL FOR AUTOMATION,
Badger Meter Mfg. Co., Milwaukee, Wis.
W. K. Genthe, R. M. Arthur, and R. Srinivasaraghavan.
Water and Wastes Engineering, Vol 9, No 7, p 42-44, July 1972, 3 fig.

Descriptors: *Biochemical oxygen demand, Waste water treatment, Instrumentation, Treatment facilities, *Indiana.

An on-line BOD respirometer that automatically withdraws a large sample (1, 2 or 4 liters) from the wastewater stream and measures the oxygen utilized by the biota was evaluated in a primary treatment plant in Indiana. Simultaneous sampling was conducted for comparison between one-hour OD's measured by the instrument and BOD's measured in the laboratory by standard methods. The on-line instrument provided usable accuracy by short term OD's with sampling frequencies of two per hour on influent and one per hour on effluent. (Smith-Texas)
W73-00157

REVERSE OSMOSIS TREATMENT OF DILUTED NICKEL-PLATING SOLUTIONS,
Ottawa Pollution Control Center (Ontario).
A. R. Hauck, and S. Sourirajan.
Journal Water Pollution Control Federation, Vol 44, No. 7, p 1372-1383, July 1972, 9 fig, 2 tab, 21 ref.

Descriptors: *Reverse osmosis, *Membranes, *Waste water treatment, *Inudstrial wastes.
Identifiers: *Nickel-plating solutions, *Acetate membranes, Low pressure, Plating wastes.

Reverse osmosis was used for the treatment of nickel-plating wastewater. The experiments were carried out at 23 to 25 C and an operating pressure of 300 psig or less. For all membranes of the improved cellulose acetate type, solute recovery was 98% with 90% product water recovery. Such treatment can contribute significantly to both water pollution control and the recovery of nickel. (Smith-Texas)
W73-00158

POLLUTION CONTROL IN SEWERS,
Black and Veatch, Kansas City, Mo.
O. J. Schmidt.
Journal Water Pollution Federation, Vol 44, No. 7, p 1384-1392, July 1972. 1 fig, 4 tab, 8 ref.

Descriptors: *Sewers, *Storm drains, *Inflow, *Design criteria, Storm runoff, Stormflow, Water pollution control, Waste water treatment, Separated sewers.
Identifiers: *Extraneous flows, Dallas, Kansas City, Billings (Montana).

The increase of excess extraneous flows in separate sanitary sewer systems is causing serious pollution problems to the point where bypassing of untreated wastes from sanitary sewer systems can no longer be allowed. Three basic measures were considered: (1) a reduction of extraneous water inflow to existing sewers, (2) prevention of extraneous water entrance in new sewers, and (3) treatment of overflows. Water inflow to existing sewers can be reduced by repairing and replacing sewer lines with polyvinyl chloride and asbestos-cement pipe; raising low manhole covers and sealing the covers with asphalt; internal grouting of sewer line breaks and bad joints; disconnecting illegal roof drains, exterior basement tile drains, and storm inlets; and television inspection of all new sewer lines. Overflows may still occur, but treatment can be provided with properly designed treatment facilities. (Smith-Texas)
W73-00159

FILTERING COMBINED SEWER OVERFLOWS,
Catalytic, Inc., Philadelphia, Pa.
J. A. Lee, C. S. Shih, and J. A. DeFilippi.
Journal, Water Pollution Control Federation, Vol 44, No 7, p 1317-1333, July 1972, 11 fig, 5 tab.

Descriptors: *Combined sewers, *Filtration, *Waste water treatment, *Stormwater runoff, Water pollution control, Biochemical oxygen demand, Chemical oxygen demand, Activated sludge, Cleaning, *Filters.
Identifiers: *Ultra-high filtration, Fiber glass filters, Filter backwashing, Trimedia filter, Up-flow filter.

The feasibility of ultra-high-rate filtration of combined wastewater and stormwater runoff was investigated. Usefulness was measured in terms of filtration rate and duration of filter run, effluent concentrations of suspended solids, 5-day biochemical oxygen demand and chemical oxygen demand, and the fraction of filtrate required for backwashing the filter. Of the three filter systems tested, the fiber glass filter performed the best by achieving at least 90% removal of SS and 70% removal of nonsoluble BOD5 at filtration rates ranging from 15 to 30 gpm/sq. ft. and with filter runs of 1 to 3 hr. duration. Soluble BOD removal was negligible in all three filter systems even with the addition of activated sludge to the influent wastewater. Pretreatment would be required in a full-scale application of this process. This would involve removal of large suspended and floatable objects by grit chamber and a series of coarse screens. Cost estimates for a full-scale filtration plant utilizing the fiber glass medium are not obtainable without further study of the fiber glass cartridge service life. (Smith-Texas)
W73-00161

AEROBIC SURFACE STABILIZATION OF REFUSE,
Kansas Univ., Lawrence.
T. M. Tilsworth.
Ph. D. Dissertation, 1970, 295 p.

Descriptors: *Waste water treatment, *Stabilization, *Sewage disposal, Landfill, *Cost analysis, Wastes, Aerobic treatment.
Identifiers: *Surface stabilization.

The feasibility of aerobic surface stabilization of refuse was investigated. Refuse mixed with several types of sewage sludge, and refuse mixed with fertilizer, was spread on the soil surface after separation of the large inert solids and grinding of the residual solid waste. The systems were evaluated during the four seasons of the year by monitoring the temperature, BOD, COD, and percent volatile solids reduction. It was determined that a full-scale system could be designed allowing 30 days detention during warm weather seasons and 120 days detention during cold weather seasons. The cost for construction and operation of the surface stabilization process, including landfilling of the inerts, is estimated to range from $5 to $7 per ton of refuse. No economic consideration was given to resale of the land or compost, and no resale of salvable materials. (Smith-Texas)
W73-00162

NUTRIENT REMOVAL BY ACTIVATED ALGAE,
Kansas Univ., Lawrence.
E. C. McGriff, Jr.
Ph. D. Dissertation, 1970, 248 p.

Descriptors: *Nutrient removal, *Waste water treatment, *Nitrogen, *Phosphorus, *Organic wastes, Biomass, Eutrophication, Light intensity, Biochemical oxygen demand, Chemical oxygen demand.
Identifiers: *Bioflocculation, Detention times, Substrate, Chlorella, Batch studies, Activated algae.

A process entitled 'Activated Algae' was developed for the removal of organic wastes as well as nutrients. The evaluation of this process entailed the determination of fundamental operating parameters such as a light-dark cycle, detention period, light intensity, and biomass concentration, which engender an effective nutrient and organic waste removal process. During the batch study stage of the research, an inorganic substrate was used; however, after conversion to continuous feed and after the activated algae system was established, the substrate was changed to domestic sewage. The results indicate that the activated algae system is effective as a nutrient and organic waste removal process and possesses the property of bioflocculation that produces a relatively solids-free effluent. Furthermore, in conjunction with a workable light-dark relationship that consisted of 3.3 min. light and 2.4 min. dark, 10 hours of detention, a mixed liquor SS concentration range of 1000 to 1400 mg/l, and a light intensity of 400 ft.-candles, were workable operational parameters. 97% BOD, 87% COD, 92% nitrogen and 74% phosphorus were removed. (Smith-Texas)
W73-00163

EVALUATION OF THE BOD TEST USING ELECTROLYSIS BOD DATA,
Iowa State Univ., Ames. Dept. of Civil Engineering.
J. H. Grantham.
Master's Thesis, 1972, 101 p, 29 fig, 14 tab, 37 ref.

Descriptors: *Biochemical oxygen demand, *Nitrification, *Electrolysis, *Waste water treatment, *Iowa, Treatment facilities, Trickling filters.
Identifiers: *Dilution method, Respirometric methods, K-rate.

The purpose was to analyze the data collected by the electrolysis and dilution methods for measuring BOD on identical wastewater samples. The study was carried out by wastewater treatment plant personnel at Ames, Marshalltown, Des Moines, and Atlantic, Iowa. It was shown that nitrification does affect BOD results in raw wastewaters, primary effluent and final effluents for both the electrolysis and dilution BOD methods. It is recommended that the electrolysis BOD method be considered an acceptable method for measuring BOD since it shows better precision in the tests made. It was also concluded that BOD reaction rates have little practical value in designing or controlling trickling filter plant performance. (Smith-Texas)
W73-00164

TERTIARY WASTEWATER TREATMENT USING PULSED ADSORPTION BEDS AND DUAL-MEDIA FILTERS,
Iowa State Univ., Ames. Dept. of Civil Engineering.
D. J. Wall.
Master's Thesis, 1972, 96 p, 31 fig, 12 tab, 8 ref, 3 append.

Descriptors: *Tertiary treatment, *Pilot plants, *Biochemical oxygen demand, *Filtration, *Waste water treatment, Trickling filters, Nutrient removal, Design criteria.
Identifiers: *Pulsed adsorption bed, Organic carbon removal.

A pilot-plant investigation of the 'Pulsed Adsorption Bed'-filter treatment system was undertaken to evaluate the effectiveness and operating characteristics of PAB process units for treatment of trickling filter plant final effluent. This pilot-plant study showed that the PAB-filter system could remove 76% BOD5 and 92% of SS from the final effluent of a secondary trickling filter plant. Flow rate had a minor effect on the efficiency of the system. The removal of soluble organic carbon was low. The PAB-filter process can be expected to remove 76% BOD5 as compared to only 50% removal by plain filtration. (Smith-Texas)
W73-00165

AN INTEGRATED BIOLOGICAL-CHEMICAL PROCESS FOR THE REMOVAL OF DEGRADABLE CARBON AND PHOSPHORUS FROM MUNICIPAL WASTEWATERS,
California Univ., Berkeley.
M. J. Humenick.
Ph. D. Dissertation, 1970, 169 p.

Descriptors: *Waste water treatment, *Phosphorus, *Carbon, *Municipal wastes, Biochemical oxygen demand, *Activated sludge, Coagulation, Organic loading.
Identifiers: *Chemical coagulation, Upflow sludge.

An initial high rate activated sludge stage followed by a chemical coagulation-precipitation stage utilizing lime or alum was used as an integrated biological-chemical process for the removal of degradable carbon and phosphorus from municipal wastewaters. The process was capable of removing over 90% of influent BOD, 95% total phosphorus, and over 95% suspended solids. Organic loadings of about 500 lb BOD/day-1000 cu ft of aerator volume could be achieved along with over 90% overall BOD removal. Phosphorus removal was achieved with either lime or alum coagulation-precipitation in the second stage. Improved clarity and phosphorus removal were achieved in effluents when upflow sludge blanket clarification was used in the final separator. (Smith-Texas)
W73-00166

BIODEGRADATION OF TRISODIUM NITRILOTRIACETATE IN A MODEL AERATED SEWAGE LAGOON,
Manitoba Univ., Winnipeg. Dept. of Microbiology.
J. W. M. Rudd, and R. D. Hamilton.
Journal of the Fisheries Research Board of Canada, Vol 29, No 8, p 1203-1208, August 1972, 3 fig, 2 tab, 17 ref.

Descriptors: *Biodegradation, *Model studies, Temperature, Aeration, *Waste water treatment, *Aerated lagoons.
Identifiers: *Model aerated sewage lagoon, *Trisodium nitrilotriacetate, Daphina.

The effect of temperature on the biodegradation of trisodium nitrilotriacetate (Na3NTA) was investigated in a model aerated sewage lagoon. The incoming Na3NTA experienced a breakdown of 93%, 47% and 22% at 15, 5, and 0.5 C respectively. The breakdown of Na3NTA was also enhanced by the presence of a bacterial predator Daphina. Although fluctuations in Na3NTA removal increased with decreasing temperature, the results of the experiment indicate at least 50% removal of incoming Na3NTA at least 6 months of the year from aerated sewage lagoons operating in the 'mid-continental' climate of the Canadian prairie provinces. (Smith-Texas)
W73-00167

COMPUTER CONTROL OF WASTEWATER TREATMENT,
Philadelphia Water Dept., Pa.
C. F. Guarino, H. D. Gilman, M. D. Nelson, and C. M. Koch.
Journal Water Pollution Control Federation, Vol 44, No 9, p 1718-1729, September 1972, 7 fig, 2 tab, 13 ref.

Descriptors: *Computer models, *Automation, *Instrumentation, *Waste water treatment, Treatment facilities.
Identifiers: *Sensors, Process control models.

Computer applications to monitoring and reporting of plant funcations are becoming common and are receiving widespread acceptance as standard practice. Because each wastewater treatment plant is a unique entity, the first step in plant automation is a comprehensive evaluation of current plant operation procedures. This has yielded various approaches to automatic monitoring and control of plant processes, such as computer-assisted plant reporting, statistical data analyses, mathematical modeling, programmed digester control, instrumentation and sensor studies, data regression analyses, and other applications of computers and instrumentation. (Smith-Texas)
W73-00169

PHOSPHATE RELEASE IN ACTIVATED SLUDGE PROCESS,
Virginia Polytechnic Inst., Blacksburg. Dept. of Sanitary Engineering.
C. W. Randall, D. W. Marshall, and P. H. King.
Journal of the Sanitary Engineering Division, American Society of Civil Engineers, Vol 96, No SA 2, p 395-408, April 1970, 7 fig, 4 tab, 28 ref.

Descriptors: *Phosphates, *Activated sludge, *Waste water treatment, Sewage treatment, Chemical oxygen demand.
Identifiers: *Carbon limitation theory, Orthophosphates, Bacteriolysis, Anoxic conditions.

Laboratory-scale batch units were used to study the factors that influence soluble phosphate release from activated sludge following phosphorus uptake and to gain insight concerning the mechanism of release. Activated sludge was first placed in a large flask and then aerated for 8 hr. at the rate of 10 ml. per l in the presence of a soluble substrate containing excess phosphate. Following uptake, mixed liquor was removed and placed into two, l-l capacity, sealed, plexiglass cylinders to study phosphate release under anoxic conditions. Aeration of the mixed liquor remaining in the large flask was continued so that phosphate release during extended aeration could be studied. It was concluded that phosphate uptake by activated sludge may exceed that required for immediate growth and that ortho-phosphate release occurs at a steady rate under extended aeration conditions. Furthermore, bacteriolysis is a major cause of activated sludge phosphate release. (Smith-Texas)
W73-00172

RELATIONSHIP BETWEEN THE OBSERVED CELL YIELD COEFFICIENT AND MEAN CELL RESIDENCE TIME IN THE COMPLETELY MIXED ACTIVATED SLUDGE PROCESS,
Cornell Univ., Ithaca, N.Y. Dept. of Civil Engineering; and Cornell Univ., Ithaca, N.Y. Dept. of Environmental Engineering.
J. H. Sherrard, and E. D. Schroeder.
Water Research, Vol 6, No 9, p 1039-1049, September 1972, 7 fig, 3 tab, 6 ref.

Descriptors: *Activated sludge, Mathematical studies, *Waste water treatment, Chemical oxygen demand, *Sludge treatment.
Identifiers: *Biological reactor.

A laboratory scale completely mixed activated sludge system was used to obtain experimental data. Hydraulic detention time was maintained constant and the sludge wasting rate was the only process parameter varied. The mean cell residence varied between 2 and 18 days by varying the sludge wasting rate. Sludge production was significantly altered; however, only a minimal change in effluent COD was observed during the span of 2-18 days. Both a linear equation and an exponential equation describe the data obtained. (Smith-Texas)
W73-00173

THE DIURNAL CYCLICAL BIOLOGICAL PURIFICATION-DEPURIFICATION OF PHOSPHATE IN AN ACTIVATED SLUDGE PLANT,
Ontario Research Foundation, Sheridan Park.
L. A. Campbell, and A. J. Horton.
Development in Industrial Microbiology, Vol 10, p 160-169, 1969, 8 fig, 1 tab, 9 ref.

Descriptors: *Activated sludge, *Phosphates, *Waste water treatment, Biological uptake, *Treatment facilities, Design, Water purification.

The biological phosphate removal process was studied in order that suggestions could be made to enhance the operating efficiency of activated sludge plants. The existence of a diurnal cyclical biological purification-depurification of phosphate was confirmed and studied in light of plant design, influent total phosphate, dissolved carbonaceous carbon, and total detention time. As a result of this study, it is suggested that the input into an activated sludge plant be at a relatively constant rate, so that depurification will not take place. Furthermore, excess sludge should be wasted outside the activated sludge system. It is suggested that the plant design is of less importance than the mode of operation. (Smith-Texas)
W73-00177

WINDHOEK RECLAIMING SEWAGE FOR DRINKING WATER,
Windhoek City Engineers Dept. (South West-Africa).
A. J. Clayton, and P. J. Pybus.
Civil Engineering, Vol 42, No 9, p 103-106, September 1972, 1 fig, 1 tab.

Descriptors: Waste water reclamation, *Tertiary treatment, *Water reuse, Cost analysis, Cost comparisons, Economics, *Waste water treatment, Sewage treatment.
Identifiers: *Windhoek (South West Africa).

The City of Windhoek in South West Africa, plagued by a chronic water shortage has been running a 1.2 mgd reclamation plant since 1969. Sewage is treated in several stages: (1) single-stage bio-filtration, (2) maturation ponds, (3) recarbonization, (4) algae flotation, (5) foam fractionation, (6) chemical dosing, (7) breakpoint chlorination, (8) rapid-gravity sand filters, and (9) activated carbon filters. The cost is 75 cents/1000 gal, including the cost of primary and secondary sewage treatment. (Smith-Texas)
W73-00178

POLYELECTROLYTE SOLUTIONS MADE WITHOUT UNDISSOLVED PARTICLES.

Chemical Engineering, Vol 79, p 34, May 1972, 1 fig.

Descriptors: *Polyelectrolytes, *Waste water treatment, Polymers, Flocculation, Coagulation, Treatment facilities.
Identifiers: *Prewetting feed systems.

A system for the total dissolution of polymer in water solvent is described that produces the polyelectrolyte solution needed for air coagulation and flocculation in wastewater treatment plants. A fast-moving water film into which particles drop was provided by a high-speed wetting drum. Combined with sprays, this drum ensures thorough prewetting of the polymer. (Smith-Texas)
W73-00179

CHICAGO RECLAIMING STRIP MINES WITH SEWAGE SLUDGE.

Civil Engineering, Vol 42, No 9, p 98-102, September 1972, 2 fig, 1 tab.

Descriptors: *Sludge disposal, Sewage disposal, *Land reclamation, Air pollution, Cost analysis, Economics, Waste water treatment, Sludge treatment, *Sludge disposal.
Identifiers: *Chicago.

Due to high costs of pollution abatement measures necessary to prevent air pollution from their heat drying method of sludge disposal, the Metropolitan Sanitary District of Chicago has begun to transport digested sludge to abandoned strip mined land and other areas with poor soils. This form of sludge disposal has had several advantages: (1) it has eliminated land, air, and water pollution stemming from sludge processing in urban areas, (2) it costs less than other sludge disposal methods, and (3) it makes use of organic materials, nutrients, and water making up the sludge. (Smith-Texas)
W73-00180

IN-LINE STRUCTURE STORES AND TREATS COMBINED OVERFLOW,
Hubbell, Roth and Clark, Inc., Bloomfield Hills, Mich.
T. G. Biehl, and M. D. Waring.
Civil Engineering, Vol 42, No 9, p 62-65, September 1972, 4 fig.

Descriptors: *Combined sewers, *Overflow, *Biochemical oxygen demand, Sewers, *Waste water treatment, Storage, Costs.
Identifiers: *Detroit.

A new in-line concrete structure and storage in the trunk sewers is responsible for a BOD reduction of 71% in combined sewer overflows in a drainage basin near Detroit. The facility stores 190 acre-feet of overflow, chlorinates it, eliminates odors, pumps out the overflow and flushes the structure. The total project cost is $26 million or $1,060 per acre of drainage area. (Smith-Texas)
W73-00181

THE USE OF ACTIVATED CARBON FOR IMPROVING THE QUALITY OF POLISHED SEWAGE EFFLUENT,
Water Pollution Research Lab., Stevenage (England).
A. Waggott, and R. W. Bayley.
Water Pollution Control, Vol 71, No 4, p 417-423, 1972, 4 fig, 2 tab, 17 ref.

Descriptors: *Activated carbon, *Sewage effluent, *Waste water treatment, Cost comparisons, Biochemical oxygen demand, Chemical oxygen demand, Organic carbon, Anionic detergents, Water quality, *Adsorption, *Tertiary treatment.

Experimental work was carried out to determine the usefulness of activated carbon as an additional polishing process following conventional treatment. Five different types of carbon were used in short-term and long-term tests to remove BOD, COD, organic carbon, and anionic detergent; color and turbidity were also measured. Granular peat and granular wood gave the poorest results; granular coals gave very good results. It was possible to remove nearly all anionic detergent, about 75% of the COD and organic carbon, and over 60% of the BOD from polished effluent. However, it would be desirable to test the feasibility of regenerating spent or exhausted carbon economically before proceeding with any designs for large-scale plants employing adsorption processes. (Smith-Texas)
W73-00182

AN INVESTIGATION INTO THE EFFECTS OF CHLORINATED SOLVENTS ON SLUDGE DIGESTION,
Exeter Sewage Treatment Works (England).
K. A. Barrett.
Water Pollution Control, Vol 71, No 4, p 389-403, 1972, 9 fig, 8 tab, 7 ref.

Descriptors: *Solvents, *Sludge digestion, *Waste water treatment, Tertiary treatment, Chemical degradation.
Identifiers: *Chlorinated solvents, Chemical treatment.

Research was conducted to determine the effects of chlorinated solvents on sludge digestion. Solvents such as carbon tetrachloride, trichloroethylene, and tetrachloroethylene, were added to raw sludge in shock doses. Gas yields were then measured to ascertain effects. It appears that digestion is more tolerant to those solvents with a higher molecular weight and a lower vapor pressure. The solvents are stripped out by the gas during digestion; the more efficient the mixing at the sludge/gas interface, allowing equilibrium to be established, the greater the removal of all volatiles. (Smith-Texas)
W73-00184

GRAVITY THICKENING OF SEWAGE SLUDGES,
Water Pollution Research Lab., Stevenage (England).
R. I. Dick.
Water Pollution Control, Vol 71, No 4, p 368-380, 1972, 10 fig, 23 ref.

Descriptors: *Activated sludge, *Waste water treatment, Suspended solids, Mathematical models, *Sewage sludge, *Sludge treatment.
Identifiers: *Gravity thickening.

Modern thickening theory is reviewed briefly and means are suggested by which the theory could be applied to waste treatment practice. Because the settling properties of sludges vary widely, and proper conditions for one sludge are inadequate for another, there is no compilation of specifications for proper settling test conditions. However, the basic approach is to ascertain that solids are not applied to a continuous thickener faster than they can be transported downward by the combined effects of gravity subsidence and bulk downward movement due to sludge withdrawal. (Smith-Texas)
W73-00185

DISK-NOZZLE CENTRIFUGES FOR SLUDGE THICKENING,
Dorr-Oliver, Inc., Stamford, Conn. Central Technology Labs.
D. R. Vaughn, and G. A. Reitwiesner.
Journal Water Pollution Control Federation, Vol 44, No 9, p 1789-1797, September 1972, 8 fig, 3 tab, 5 ref.

Descriptors: *Activated sludge, *Waste water treatment, *Centrifugation, Digestion, Costs, Capital costs, *Sludge digestion.
Identifiers: *Gravity thickening, Solids removal.

A disk-nozzle centrifuge was tested to determine if this approach could be used to: (1) reduce the volume of waste activated sludge, (2) increase digester capacity, (3) reduce pumping and hauling cost for direct land disposal, and (4) allow im-

proved operation of gravity thickeners on primary sludge alone. A high-speed centrifuge was operated at a speed of 3,000 rpm and at feed rates up to 400 gpm (1.5 cu m/min). This machine is capable of thickening dilute waste streams to reasonable concentrations of 4 to 6 percent TS with satisfactory solids recovery. Besides requiring 75% less space than a combined gravity thickener, the capital costs are approximately one-third less. (Smith-Texas)
W73-00186

EFFECT OF TEMPERATURE ON THE REMOVAL OF NTA (NITRILOTRIACETIC ACID) DURING SEWAGE TREATMENT,
Water Pollution Research Lab., Stevenage (England).
G. E. Eden, G. E. Culley, and R. C. Rootham.
Water Research, Vol 6, No 8, p 877-883, August 1972. 6 fig, 6 ref.

Descriptors: *Temperature, *Sewage treatment, *Activated sludge, *Detergents, Biodegradation, Eutrophication, *Nitrilotriacetic acid, Treatment facilities, Winter, *Waste water treatment.
Identifiers: *NTA removal, *Detergents removal, *Temperature effects, Great Britain, Triphosphate.

The biodegradation of nitrilotriacetate has been studied using activated-sludge units of the porous-pot type. At 20C, after acclimatization, degradation was complete, but at temperatures below 10C degradation was less complete until at 5C it passed through the treatment process virtually unchanged. NTA, BOD, and COD analyses were run. It is concluded that in the United Kingdom in winter an appreciable proportion of any NTA in sewage would pass through sewage treatment works into rivers. (Oleszkiewicz-Vanderbilt)
W73-00216

AN ADVANCED OPTIMIZATION TECHNIQUE FOR TURBINE, CONDENSER, COOLING SYSTEM COMBINATIONS,
Westinghouse Electric Corp., East Pittsburgh, Fuels and Energy Systems. Pa.
L. G. Hauser, K. A. Oleson, and R. J. Budenholzer.
Proceedings of the American Power Conference, Vol 33, p 427-445, 1971. 16 fig, 4 ref.

Descriptors: *Optimization, *Comparative costs, *Cooling, *Economics, *Thermal pollution, *Condensers, *Turbines, Thermal powerplants, Heat, Cooling towers, Weather data, Fuels, Design, Design criteria, Equipment, Water pollution, Air pollution, Heat balance, Water users.
Identifiers: *Cooling systems, *Turbine cooling systems, Spray ponds, Cooling lakes, Water systems, Cooling equipment, Equipment selection.

The recent widespread adoption of Federal and state thermal pollution regulations will result in an increased use of supplementary methods to reject waste heat at future plant sites. Since these methods will be costly, the various alternatives should be carefully evaluated for each application. Although simplified methods for optimizing cooling system design specifications could be used, only a detailed evaluation considering both capital and operating costs can ensure real savings over the entire plant life. The apparent capital cost savings of many feasible combinations may be more than offset by other costs when all the important factors are evaluated. Besides the outline of optimization techniques, two appendices are included which list input data required for cooling system optimization and present a sample turbine-cooling system optimization study. (Oleszkiewicz-Vanderbilt)
W73-00220

ANALYSIS AND DESIGN OF HYPERBOLIC COOLING TOWERS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
G. Gurfinkel, and A. Walser.
Journal of the Power Division, American Society of Civil Engineers, Vol 98, No PO1, Paper 8997, p 133-152, June 1972. 17 fig, 2 tab, 18 ref.

Descriptors: *Cooling towers, *Design, *Loads (Forces), *Stresses, *Analysis, *Winds, Beams (Structural), Building (Codes), Columns, Computers, Earthquakes, Generators, Membranes, Moments, Powerplants, Reinforcement, Structural engineering, Wind pressure.
*Hyperbolic cooling towers, *Shells (Structural forms), Hoop reinforcement, Deep beams, Rings, Meridional forces, Self-weight stresses.

The analysis and design of a given hyperbolic cooling tower for a nuclear power plant are reviewed. Analysis is performed using available computer programs. Various loading conditions on the tower such as wind, earthquake, thermal, and self-weight, are considered and their effects are combined and compared. A number of wind-load distributions, used in Britain, Britain, Belgium, and the U.S. are taken for the analysis; and the corresponding results are compared. The effects of various conditions of base restraint on the results are also studied. The design of the reinforcement for the shell is given, with details of the actual reinforcement layout. Wind loading is the governing design condition for hyperbolic towers. It is suggested that ultimate design methods be used with adequate load and capacity-reduction factors. To prevent widespread cracking of the concrete, the design should call for reinforcement bars placed in double layers in both faces of the shell. (Oleszkiewicz-Vanderbilt)
W73-00225

WATER RECLAMATION FOR GROUND WATER RECHARGE,
Oklahoma Water Resources Research Inst., Stillwater.
D. F. Kincannon, and W. G. Tiedermann.
Available from the National Technical Information Service as PB-212 587, $3.00 in paper copy, $0.95 in microfiche. Completion Report, June 1972. 34 p, 11 fig, 5 tab, 8 ref. OWRR A-034-OKLA (1).

Descriptors: *Water reuse, *Artificial recharge, *Groundwater management, Water treatment, *Separation techniques, Infiltration.
Identifiers: *Solids-liquid separation, *Hydrocyclones.

The purpose was to develop solid-liquid separation techniques so that surface waters can be used to effectively recharge a groundwater aquifer. Specifically, the research effort centered around (1) the development of an efficient, low pressure drop 2 GPM hydrocyclone, (2) the determination of the appropriate chemical treatment for clay-laden water when hydrocyclones are used, and (3) infiltration studies with a laboratory aquifer. The statistical experimental design techniques did yield a significantly improved hydrocyclone design. Furthermore, the separation performance of the 'best' hydrocyclone could be improved from an efficiency of 65 percent to an efficiency of 78 percent when the correct chemical treatment is used. However, it is possible for chemical treatment to actually decrease the removal efficiency. The infiltration studies show that a high degree of separation efficiency is required before clay-laden waters can be used as recharge waters. However, further study is needed before direct application of hydrocyclones is made for recharging aquifers with reclaimed surface waters.
W73-00269

REMOVING HEAVY METALS FROM WASTE WATER,
Dean Associates, North Scituate, R.I.
J. G. Dean, F. L. Bosqui, and K. H. Lanouette.
Environmental Science and Technology, Vol 6, No 6, p 518-522, June 1972. 3 fig, 1 tab, 5 ref.

Descriptors: *Heavy metals, Waste water (Pollution), *Separation techniques, *Trace elements, *Pollutant identification, *Chemical precipitation, Solvent extractions, Ion exchange, Industrial wastes, Adsorption, Activated carbon, Reverse osmosis, Iron, Lead, Manganese, Mercury, Molybdenum, Nickel, Zinc, Copper, Cadmium, Cobalt, Chromium, Membrane processes, Filtration, Methodology, Anodes, Solubility, Semipermeable membranes.
Identifiers: *Electrodeposition, *Cementation, *Ultrafiltration, Pickling, Ion exchange resins, Organic solvents.

The following methods can be used in removing heavy metals from waste water: chemical precipitation, electrodeposition, cementation, solvent extraction, ultrafiltration, ion exchange, and activated carbon adsorption. The chemical precipitation method is the most generally applied of the methods, and is used primarily for the simple and low cost removal of Cu, Zn, Fe, Mn, Ni, and Co. Electrodeposition techniques employ insoluble anodes and acid pickling to remove metals such as Cu from waste solutions while cementation employs the technique of contacting a metal-bearing solution with the correct metal powder or scrap to precipitate certain selected metals as metallic 'sponge'. The solvent extraction treatment scheme (liquid ion exchange) involves extracting a particular metal from solution with an organic reagent, mixing the resulting soluble form with a water-immiscible solvent (e.g., kerosene), and acid-treating the organic complex thus releasing the metal in a concentrated, water-soluble form which can be handled by conventional recovery methods. The reverse osmosis or ultrafiltration process consists primarily of a network of semipermeable membranes that permits soluble compounds of various molecular size ranges to pass through their pores. The ion exchange resin method can be successful if a selected purified dilute stream from pretreated waste were contacted with a suitable resin. Use of the activated carbon adsorption method for metal removal shows considerable promise for the removal of the last trace of metal (in the range of about 1 to 2 parts per million) following electrodeposition or cementation. (Byrd-Battelle)
W73-00287

MICROBIOLOGY OF SCUM FORMED AT THE SURFACE OF LAGOONED WASTEWATER,
Maharaja Sayajirao Univ. of Baroda (India). Dept. of Biochemistry.
For primary bibliographic entry see Field 05B.
W73-00299

VARIATION OF BOD REMOVAL AND ITS CONTROL IN A LARGE SCALE PLANT USING THE ACTIVATED SLUDGE PROCESS, (IN JAPANESE),
Sankyo Co. Ltd., Tokyo (Japan). Research Lab.
Yoo Takiguchi.
J Ferment Technol. Vol 49, No 8, p 680-687. 1971. Illus. English summary.
Identifiers: *Activated sludge, Biological control, Oxygen, Seasonal, Sludge, *Biochemical oxygen demand, *Waste water treatment, Treatment facilities.

The MLSS (mixed liquor suspended solid) value and the BOD (biological oxygen demand) value in the effluent were kept constant all year round; the BOD removal value (kg/m3 day) in a large scale plant varied according to the water temperature in the aeration tank; the value in winter was less than 50% of that in summer. The dissolved O2 in the aeration tank decreased quickly as the temperature rose, and became zero at more than 20 degrees C. The relation between the O2 consumption rate and the water temperature in a large scale

plant coincided with the results from small scale experiments. The KL alpha 20 value in the large scale aeration tank was determined and calculated to be 6.11. The dissolved O2 value in the aeration tank, which was calculated theoretically on the basis of KL alpha 20 = 6.11, coincided with the value determined practically. A control method for a large scale plant was proposed, which would be able to remove excess dissolved O2 from the aeration tank in winter and to correct the anaerobic condition in the summer. This method involves changing the MLSS according to the water temperature. The MLSS in winter is 4 times that in summer. Using this method, the efficiency of the plant (BOD loading, 1.6 kg/m3 day; BOD removal, 1.25-1.3 kg/m3 day) could be kept constant throughout the year.–Copyright 1972, Biological Abstracts, Inc.
W73-00315

AREAWIDE WATER/SEWER ELEMENT AND PROGRAM.
Boyle Engineering, Bakersfield, Calif.

Kern County Council of Governments, Bakersfield, California, April 1972. 55 p, 2 fig, 7 tab, 28 ref.

Descriptors: *Water supply development, *Sewerage, *Comprehensive planning, *Waste water disposal, *Municipal water, *Storm drains, Programs, Water demand, Administration, Water supply, Planning, Waste water treatment, Sewage treatment, Regional analysis, Regional development, Long-term planning, California.
Identifiers: *Kern County (California).

The Program includes the major water, sewer and storm drainage facilities required and a schedule of priorities, including a description of the needed improvements, a general estimate of their cost, and the time they will be needed. The Plan contains a descriptive statement as to its relationship to the adopted Areawide Goals and Objectives and the adopted Areawide Development Guide. It includes a delineation and description of the various service areas, the type and general location of major facilities, a clear allocation of responsibilities for carrying out its recommendations, and for citizen participation. It is based upon detailed plans prepared for 18 communities in the area. It is recommended that engineering feasibility studies be made for projects and that methods of financing be explored. A water supply master plan for the Kern River Valley is suggested. (Poertner)
W73-00448

WATER QUALITY MANAGEMENT FOR METROPOLITAN WASHINGTON: THE NORTHERN VIRGINIA PLAN.
Northern Virginia Planning District Commission, Falls Church; and Metropolitan Washington Council of Governments, D.C.

April 1972. 327 p, 84 fig, 72 tab, 95 ref.

Descriptors: *Water quality, *Watershed management, *Water pollution control, *Water quality control, *Planning, *Water quality act, Potomac River, Virginia, Administration, Comprehensive planning, Long-term planning, Urbanization, Waste water disposal, Sewage treatment, Water demand, Water conservation.
Identifiers: *Northern Virginia.

The purpose of this plan is threefold: (1) To compile in one document the pertinent facts, background, and decision rationale that culminate in an effective water quality management plan; (2) To satisfy the interim planning requirement that is a precondition to State and Federal aid for the construction, expansion, or upgrading of water pollution control facilities; and (3) To lay the foundation for the development of the comprehensive water quality management plan required by July 1, 1973, for State and Federal aid. This interim plan focuses on the five study areas in which local jurisdictions are seeding State and Federal financial aid for the interconnection of existing sewage treatment plants, expansion and upgrading of treatment facilities, and construction of one new treatment facility. The total cost of construction contracts for these facilities is estimated to be $145 million. Five study areas are defined and include portions of the counties of Fairfax, Arlington, Prince William and Loudoun. Recommendations are presented on matters pertaining to needed data and studies, planning and water quality control programs. One of these is that the NVPDC should initiate a study to evaluate the effectiveness of sedimentation control programs in Northern Virginia and recommend legal and operational changes to overcome any constraints that limit the effectiveness of these programs. (Poertner)
W73-00449

THE MUTUAL DOMESTIC WATER AND SEWAGE WORKS PROJECTS.
New Mexico Environmental Improvement Agency, Santa Fe. Water Quality Section.
For primary bibliographic entry see Field 06C.
W73-00451

STATE CONSTRUCTION GRANT PROGRAM, SEWAGE TREATMENT FACILITIES IN NEW MEXICO, 1971.
New Mexico Environmental Improvement Agency, Santa Fe. Water Quality Section.

January 1972. 33 p, 37 fig, 11 tab.

Descriptors: *Data collections, *Sewage works, *New Mexico, *Finance, Government finance, Sewage treatment, Waste water treatment, Municipal wastes, Sewage treatment plants, Project summaries, Project planning.

The State of New Mexico's Water Pollution Control Program is carried out by the Environmental Improvement Agency, a constituent agency of the New Mexico Water Quality Control Commission. With funding from three levels (federal, state and local), 14 grants for the construction of sewage treatment facilities have been approved since 1970, totaling $3,282,740 in federal funds and $1,586,110 in State funds. An additional five grants are still pending. Before the State's participation, over 131 projects were completed with federal funding under Public Law 84-660 (the Water Pollution Control Act). This publication describes the 14 grants approved for State funds and includes photographs of areas and plants before and after the project. A list of the 131 sewage treatment facility projects funded under Public Law 84-660 is included. (Poertner)
W73-00452

REGIONAL WATER AND WASTEWATER MANAGEMENT: TECHNICAL REPORT.
Ayres, Lewis, Norris and May, Inc., Ann Arbor, Mich.
For primary bibliographic entry see Field 06D.
W73-00454

REGIONAL WATER AND WASTEWATER MANAGEMENT: APPENDICES.
Ayres, Lewis, Norris and May, Inc., Ann Arbor, Mich.
For primary bibliographic entry see Field 06D.
W73-00455

CENTRAL UPPER PENINSULA WATER AND WASTE WATER PLAN.
Central Upper Peninsula Planning and Development District, Escanaba, Mich.

April 1972. 238 p, 71 fig, 30 tab, 67 ref. HUD, Mich. P-323-370.

Descriptors: *Water supply development, *Water policy, *Cities, *Municipal water, *Waste water disposal, *Comprehensive planning, Long term planning, Urbanization, Michigan, Water resources development, Project planning, Programs, Water demand, Administration, Water supply, Planning, Sewerage, Waste water treatment, Sewage treatment, Financing, Census, Regional analysis, Regional development.
Identifiers: *Upper Peninsula of Michigan.

A policy plan is presented for public water and waste water services in the Central Upper Peninsula of Michigan. Region-wide goals, objectives, and policies for providing such services are the focus of the Plan. Based on these, local policies for extension of these services are recommended and mapped for communities in the region. The 160 resultant improvement projects are tabulated in an appendix. Background information provided includes population projections to 1990, population estimates for small communities and minor watersheds, an analysis of the region's geology, mapped inventories of existing water and waste water facilities, and critical review of all existing proposals for facility improvements. These proposals are listed in the Bibliography, together with the individual community comprehensive plans on which many recommended policies are based. Available means of financing water and waste water facilities in the region are examined in detail. Present service charges in all the region's communities are reviewed, and guidelines for rate-making are suggested. Capital improvements programming is explained and a regional program, based on the Plan's goals and objectives, is presented. (Poertner)
W73-00460

TOWN OF PORTAGE LAKE, MAINE, PRELIMINARY DESIGN REPORT, POLLUTION CONTROL PROGRAM.
Jordan (Edward C.) Co., Inc., Portland, Maine.
For primary bibliographic entry see Field 05G.
W73-00461

APPARATUS AND METHOD OF FILTERING SOLIDS FROM A LIQUID EFFLUENT,
Hydro-Clear Corp., Avon Lake, Ohio.
D. S. Ross.
U.S. Patent No 3,587,861, 6 p, 16 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 887, No 5, p 1585, June 28, 1971.

Descriptors: *Patents, *Waste water treatment, *Filtration, *Filters, Water treatment, Water purification, Equipment, Water pollution treatment, Separation techniques, Pollution abatement.

The equipment consists of a tank unit including juxtaposed filter, backwash, and holding tanks. The filter tank has a lower outlet chamber; a sand-type filter bed above the chamber and a flat upper surface. The sand filter has filtering passageways extending from the surface to the lower chamber for filtering effluent as it passes through the sand bed. There is an effluent inlet above the surface and an outlet port in the chamber to pass the filtered effluent to the backwash tank. An outlet is provided for connecting the backwash conduit to the holding tank and a pump for pumping backwash fluid through the sand filter bed and into the backwash conduit at a preselected constant rate. (Sinha-OEIS)
W73-00514

PROCESS FOR AGGLOMERATING AND COAGULATING WASTE MATERIAL,
J. W. Gooch.
U.S. Patent No 3,586,627, 5 p, 1 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 887, No 4, p 1285, June 22, 1971.

Descriptors: *Patents, *Bubbles, *Waste water treatment, Treatment, *Chlorine, *Coagulation,

Water pollution treatment, Pollution abatement, Separation techniques.
Identifiers: *Agglomeration, *Chlorine gas, Gas bubbles.

A reagent solution is introduced into the waste water in such manner as to form a microscopically dispersed gaseous phase which is selectively adsorbed on the surfaces of the suspended solids and organic waste materials causing agglomeration and coagulation. Fourteen examples are presented. In a particular usage a chlorine water solution was prepared to be used for generating microbubbles of chlorine gas within the liquid media. The chlorine gas reacted with the particulate material at the points of adsorption and produced areas of surface characteristics which induced agglomeration and coagulation. (Sinha-OEIS)
W73-00517

Texaco Inc., New York. (assignee).

U.S. Patent No 3,586,625, 3 p, 2 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 887, No 4, p 1284, June 22, 1971.

Descriptors: *Patents, *Nitrogen, *Phosphorus, *Aeration, *Oxidation, Treatment, *Biological treatment, *Waste water treatment, Coke, Carbon dioxide, Organic compounds, Microorganisms, Pollution abatement, Water pollution, Water pollution treatment, Biochemical oxygen demand, Chemical oxygen demand.
Identifiers: *Chemical treatment.

Waste water is fed into a coking zone and heated to a temperature in the range of 400 to 700 F under pressure to prevent the vaporization of water and to form coke, carbon dioxide, and low molecular weight oxygenated organic compounds. The liquid effluent is oxidized with air at above 450 F. The growth of microorganisms is stimulated and they consume the soluble nitrogen and phosphorus compounds before the water is directed into waterways. (Sinha-OEIS)
W73-00518

WATER PURIFICATION,
McDonnell Douglas Corp., Santa Monica, Calif. (assignee).
G. A. Guter, and L. M. Tint.
U. S. Patent No. 3,582,485, 4 p, 2 fig, 2 tab, 2 ref; Official Gazette of the United States Patent Office, Vol 887, No 1, p 279, June 1, 1971.

Descriptors: *Patents, *Electrochemistry, *Water purification, Potable water, Urine, Swimming pools, *Electrolysis, Chlorine, Bromine, *Halogens, Water quality, *Organic matter, *Waste water treatment, Sewage treatment.

A process is provided for purification of secondary effluent waste water, urine, swimming pool water, or drinking water. Nine examples illustrate this process which involves electrochemically decomposing water soluble organics in water. The liquid to be treated is led into a direct current electrolysis cell having an anode and cathode in a single compartment. A water soluble chloride is provided and the concentration of Cl- ion in the water adjusted to within a range of .010% to about 10% and then Br- ion is added to give a concentration of .01% to about 10%. Continuous stirring is required. A voltage of 1.6 to 5 volts is applied to the electrodes for a time sufficient to allow complete electrochemical decomposition of the water soluble organic matter in the water. (Sinha-OEIS)
W73-00524

APPARATUS FOR THE PREVENTION OF AIR AND WATER POLLUTION IN THE MAKING OF WOODPULP FOR PAPER MAKING,
W. C. Eggert.
U. S. Patent No. 3,581,897, 3 p, 5 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 887, No 1, p 151, June 1, 1971.

Descriptors: *Patents, *Air pollution, Water pollution, Pollution abatement, *Pulp wastes, Pulp and paper industry, Chemical wastes, Equipment, Treatment, Water pollution treatment, *Waste water treatment.
Identifiers: Woodpulp industry.

The liquid residue is moved to a duct which has a spray chamber connected to it. The spray chamber has a downward convergent frustoconical bottom wall provided with a central depending outlet conduit and a sealed receiving tank. The receiving tank has filter trays for filtering the liquid rising into the upper portion of the tank, with an overflow pipe for drawing off the filtered liquid. The tank has a lower drain conduit for draining off the chemical sludge to a separate collection point. (Sinha-OEIS)
W73-00528

PROCESS FOR TREATING SEWAGE AND OTHER CONTAMINATED WATERS,
Litton Systems, Inc., Beverly Hills, Calif. (assignee).
J. E. Uridil.
U. S. Patent No. 3,580,840, 5 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 886, No 4, p 926, May 25, 1971.

Descriptors: *Patents, *Aerobic treatment, *Yeasts, *Microorganisms, Nutrients, Water pollution, *Biological treatment, Sewage treatment, *Waste water treatment, Pollution abatement, Water pollution treatment, Biochemical oxygen demand.

Contaminated water is introduced into a zone which is bounded in part at least by a porous membrane or barrier. A microorganism (e.g. a yeast) is placed into this zone. Organic and inorganic contaminants in the sewage rapidly penetrate through the porous barrier and are quickly converted into microbial products or by-products. By the use of known and frequently pure species of microorganisms, it is possible to obtain microbial growth products with recognized commercial value. By the use of several different microorganisms each protected or restrained by its own porous barrier, it is possible to remove a broad spectrum of contaminants from waste water. (Sinha-OEIS)
W73-00531

HEAT TREATED WASTE SLUDGE DISPOSAL,
Dorr-Oliver Inc., Stamford, Conn. (assignee).
R. P. Logan, and O. E. Albertson.
U. S. Patent No. 3,580,193, 4 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 886, No 4, p 775, May 25, 1971.

Descriptors: *Patents, *Sludge treatment, Sewage treatment, *Waste water treatment, *Sludge disposal, *Dewatering, Pollution abatement, Water pollution.

Sewage sludge is pressure cooked by heat exchange to 350-400F at a pressure sufficient to prevent evaporation for approximately 30 min to free bound cell water. The freed water is decanted and the remaining sludge is dewatered by centrifuge or filter to a very dry cake. The cake is continuously fed to a fluidized bed combustion chamber for autogenous combustion. The sludge is reduced to inert burned exhaust gases and finely divided ash entrained with the gases. (Sinha-OEIS)
W73-00534

METHOD FOR PURIFYING WASTE WATER,
Standard Oil Co. of Indiana, Chicago, Ill. (assignee).
J. F. Grutsch, and R. C. Mallatt.
U. S. Patent No. 3,589,997, 4 p, 6 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 887, No 6, p 2102, June 29, 1971.

Descriptors: *Patents, *Oily water, *Oil wastes, *Oil industry, *Oil pollution, Water treatment, *Waste water treatment, *Aeration, Lagoons, Sludges, *Microorganisms.

Waste water, particularly oil refinery waste water, is treated in a series of lagoons in which microorganisms feed on the undesirable contaminants. Mobile aerators move across the lagoons' surfaces introducing air and churning the surface water. The lower portions of water are stirred keeping the sludge in suspension for more complete aeration. (Sinha-OEIS)
W73-00535

REMOVAL OF PHOSPHATE ION BY FLOTATION WITH AN ANIONIC SURFACTANT,
Grace (W. R.) and Co., New York (assignee).
J. Block.
U. S. Patent No. 3,583,909, 3 p, 2 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 887, No 2, p 636, June 8, 1971.

Descriptors: *Patents, *Phosphates, *Nutrients, *Metals, *Bubbles, *Waste water treatment, Pollution abatement, Water treatment, Water pollution, Treatment, Flotation.
Identifiers: *Chemical treatment.

Phosphate-precipitating ions are added to waste water in amounts about equimolar to the amount of phosphate ions present. The ion additives may be Al, Fe, Cu, Pb, Ba, Bi, Cd, Ni, Co, Hg, Sb, Zr, Hf, Sr, and Zn. The precipitate is floated to the surface with bubbles. The froth may then be removed. (Sinha-OEIS)
W73-00542

HYDRODYNAMICS OF COLUMNS WITH PARALLEL DENSE STRATIFICATION (HYDRODYNAMIQUE DES COLONNES A LIT DENSE EN PARALLELE),
Commissariat a l'Energie Atomique, Grenoble (France). Centre d'Etudes Nucleaires.
For primary bibliographic entry see Field 05B.
W73-00575

HEAT TRANSFER IN A COOLING POND,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki, Leningrad (USSR).
For primary bibliographic entry see Field 05B.
W73-00579

THERMAL DIFFUSION OF THE WARM WATER OF POWER PLANTS INTO A SEA BASIN,
Imatran Voima Osakeyhtio, Helsinki (Finland).
For primary bibliographic entry see Field 05B.
W73-00580

THE EFFECT OF THE POWER PLANT THERMAL LOAD ON THE BAY OF NAANTALI,
Imatran Voima Osakeyhtio, Helsinki (Finland).
For primary bibliographic entry see Field 05B.
W73-00581

THE MECHANISM DESCRIBING OXYGEN TRANSFER FROM THE ATMOSPHERE TO DISCHARGE THROUGH HYDRAULIC STRUCTURES,
Ohio River Div. Labs., Cincinnati.
For primary bibliographic entry see Field 08B.
W73-00584

ON THE CENTRALIZATION OF WASTE-WATER TREATMENT FACILITIES,
Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering.
B. J. Adams, J. S. Dajani, and R. S. Gemmell.

Water Resources Bulletin, American Water Resources Association, Vol 8, No 4, p 669-678, August, 1972. 1 fig, 5 tab, 9 ref.

Descriptors: *Water pollution, *Waste water treatment, *Planning, Economics, *Regional analysis, *Water quality, Equations, Costs, Diseconomies of Scale, Mathematical models, Operations research, Optimization.
Identifiers: *Collection networks.

Two factors affecting the centralization of wastewater treatment facilities are investigated: cost of treatment systems and of collection and the performance of treatment plants. Shortcomings are elucidated of the current assumption that centralization is economically and environmentally desirable. Based on computer-generated minimum cost designs, waste water collection networks are found to be characterized by diseconomies of scale of magnitude similar to the reported economies of scale for wastewater treatment works. The combined costs of collection and treatment are U-shaped functions from which least cost size of collection and treatment systems are found for particular values of population density. Examination of day-to-day performance of five metropolitan-area wastewater treatment plants reveals that, for time series shorter than one month, the day-to-day variation in effluent quality is random, although the variation in quantity discharged is distinctly nonrandom. Perfromances of all five plants on any given day shows little correlation, suggesting that the decentralization of treatment facilities can produce benefits both through reduction in quantities of waste discharged at a given point and through in-stream averaging of the varying performances of several treatment plants. Cost function of collection and treatment combined is generally flat in the region of the minimum-cost size. (Bell-Cornell)
W73-00640

5F. Water Treatment and Quality Alteration

CHLORINE TOLERANCE OF THE COLONIAL HYDROID BIMERIA FRANCISCANA,
Academy of Natural Sciences of Philadelphia, Pa.; and Benedict Estuarine Lab., Md.
For primary bibliographic entry see Field 05C.
W73-00011

THE MECHANISM OF WASTE TREATMENT AT LOW TEMPERATURE, PART A. MICROBIOLOGY,
Colorado State Univ., Fort Collins. Environmental Resources Center.
For primary bibliographic entry see Field 05D.
W73-00139

THE MECHANISM OF WATER TREATMENT AT LOW TEMPERATURE, PART B, SANITARY ENGINEERING,
Colorado State Univ., Fort Collins. Environmental Resources Center.
For primary bibliographic entry see Field 05D.
W73-00140

PHYSICOCHEMICAL FACTORS AFFECTING THE OXIDATION OF PHENOLIC COMPOUNDS BY OZONE,
Michigan Univ., Ann Arbor. Water Resources and Sanitary Engineering.
For primary bibliographic entry see Field 05B.
W73-00170

AREAWIDE WATER/SEWER ELEMENT AND PROGRAM.
Boyle Engineering, Bakersfield, Calif.
For primary bibliographic entry see Field 05D.
W73-00448

THE MUTUAL DOMESTIC WATER AND SEWAGE WORKS PROJECTS.
New Mexico Environmental Improvement Agency, Santa Fe. Water Quality Section.
For primary bibliographic entry see Field 06C.
W73-00451

REGIONAL WATER AND WASTEWATER MANAGEMENT: TECHNICAL REPORT.
Ayres, Lewis, Norris and May, Inc., Ann Arbor, Mich.
For primary bibliographic entry see Field 06D.
W73-00454

REGIONAL WATER AND WASTEWATER MANAGEMENT: APPENDICES.
Ayres, Lewis, Norris and May, Inc., Ann Arbor, Mich.
For primary bibliographic entry see Field 06D.
W73-00455

CENTRAL UPPER PENINSULA WATER AND WASTE WATER PLAN.
Central Upper Peninsula Planning and Development District, Escanaba, Mich.
For primary bibliographic entry see Field 05D.
W73-00460

FILTER FOR WATER SUPPLY,
J. C. Gregory.
U. S. Patent No 3,585,130, 2 p, 2 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 887, No 3, p 919, June 15, 1971.

Descriptors: *Patents, *Filters, *Filtration, Treatment, Equipment, Water purification, Water treatment, Water pollution treatment, Separation techniques.
Identifiers: *Activated charcoal.

A filtering and cooling system for municipal, private and auxiliary water supplies is described. The equipment consists of a hollow tubular housing, a pair of disk shaped caps for insertion one in each end of the housing. The caps have a flange for engaging the outside end of the housing. A collar extends from the flange into the housing and a perforated base extends from across the housing. A wafer of liquid permeable porous material is arranged within each disk. Activated charcoal is used inside the housing. (Sinha-OEIS)
W73-00521

METHOD FOR TREATING WATER BY ION EXCHANGE,
Ecodyne Corp., Chicago, Ill. (assignee).
E. Salem.
U. S. Patent No. 3,585,127, 6 p, 2 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 887, No 3, p 919, June 15, 1971.

Descriptors: *Patents, *Water treatment, Water purification, *Ion exchange, *Resins, *Cation exchange, Anion exchange, Water pollution treatment, Water quality control, Treatment, Separation techniques, Leakage.

Water is passed through a service layer of anion and cation exchange resins in a service zone. Then it is passed through a leakage barrier layer of cation exchange resin. The anion exchange resin is then regenerated in an anion resin regeneration zone, and the cation exchange resin is regenerated in another zone. A portion of the cation exchange resin is transferred to the service zone to establish a leakage barrier layer. The remainder of the cation exchange resin is mixed with the anion exchange resin, and the mixed resins are transferred to the service zone to establish a service layer of anion and cation exchange resins. (Sinha-OEIS)
W73-00522

HARD WATER TREATMENT,
Allied Chemical Corp., New York (assignee).
X. T. Stoddard.
U. S. Patent No. 3,583,910, 4 p, 2 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 887, No 2, p 636, June 8, 1971.

Descriptors: *Patents, *Water treatment, *Water softening, Treatment, *Demineralization, Impaired water quality, *Scaling, Water quality control, Equipment, Separation techniques.

Feed water is directed into a double-walled chamber and mixed with superheated steam. The mixture is maintained in an agitated condition to achieve rapid precipitation of the scale-forming salts. The mixture with the particles of precipitate suspended in it is discharged into a second zone where it is held in a quiescent state. The particles settle out forming a sludge leaving the softened water as a supernatant layer free of suspended particles. A portion of the sludge may be returned for recirculation. (Sinha-OEIS)
W73-00523

INSTALLATION FOR THE TREATMENT OF WATER AND AQUEOUS SOLUTIONS,
Societe Grenobloise d'Etude et d'Applications Hydrauliques (France).
P. Minart.
U. S. Patent No. 3,581,894, 5 p, 3 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 887, No 1, p 150, June 1, 1971.

Descriptors: *Patents, *Water purification, Water quality, *Ion exchange, Resins, Equipment, Treatment, *Water treatment, *Water softening, *Demineralization.
Identifiers: Decarbonation.

Liquids are treated by means of moving-bed ion-exchange resins with intermittent upward motion of the bed. Regeneration, washing and exhaustion are effected simultaneously in respective sections of the column one above the other. The recovery of each successive batch of exchange resins is effected by causing it to spill over from the top of the column into a chamber in which a flow of raw liquid fluidizes them and conveys them to a separator. The separator is designed to separate out and eliminate by cyclonic action the fine particles of material retained in the bed during exhaustion. The raw liquid is evacuated by means of a constant-discharge controlling device. (Sinha-OEIS)
W73-00529

5G. Water Quality Control

BIOLOGICAL INCRUSTATION OF WELLS DUE TO MASS DEVELOPMENT OF IRON AND MANGANESE BACTERIA,
Bundesgesundheitsamt, Berlin (West Germany). Institut fuer Wasser-, Boden-, und Lufthygiene.
U. Hasselbarth, and D. Ludemann.
Water Treatment and Examination, Vol. 21, p 20-29, 1972. 3 fig, 2 tab, 12 ref.

Descriptors: *Water wells, *Iron bacteria, Wells, *Bacteria, Iron, Oxidation-reduction potential.
Identifiers: *Biological encrustation, *Manganese bacteria, Incrustation, Encrustation.

Biological incrustation is widespread and will curtail the output of wells within a short time even if no other corrosion processes occur. It is dependent upon the presence of iron and manganese accumulating bacteria, the oxidation-reduction potential and rH value, respectively, of waters entering the well, and their content of Fe (2+). It can therefore be established by experimental pumpings during test drilling whether a well will tend toward biological incrustation. If this is so, it may be possible to move the well to a water catchment area not exposed to the same risk or to

provide it with features facilitating cleaning or regeneration. If decreasing capacity is expected, new wells to ensure the supply can be planned in time. Methods of preventing biological encrustation could be employed from the time the well starts operation. Incrustation of the well should not be allowed to reach the stage where it affects the yield or is visible. (Svensson-Washington)
W73-00008

DOCUMENTS FOR THE U.N. CONFERENCE ON THE HUMAN ENVIRONMENT, STOCKHOLM, JUNE 5-16, 1972--PART 1.
Department of State, Washington, D. C.
For primary bibliographic entry see Field 06G.
W73-00042

AN ACT...TO MAINTAIN PREVENTIVE PROCEDURES CIRCUMVENTING DISPOSAL OF TRASH OR JUNK INTO STATE WATERS.
For primary bibliographic entry see Field 06E.
W73-00046

CAN THE U.S. WIN THE WAR AGAINST POLLUTION.
For primary bibliographic entry see Field 06E.
W73-00047

MANITOWOC HARBOR, WISCONSIN (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Chicago, Ill.
For primary bibliographic entry see Field 04A.
W73-00048

EQUALIZATION OF WASTEWATER FLOWS,
O'Brien and Gere Engineers, Inc., Syracuse, N.Y.
For primary bibliographic entry see Field 05D.
W73-00066

THERMAL POLLUTION AND THE POWER INDUSTRY,
Potomac Electric Power Co., Washington, D. C.
For primary bibliographic entry see Field 05C.
W73-00067

AGRICULTURAL AND AQUACULTURAL USES OF WASTE HEAT,
Oak Ridge National Lab., Tenn.
M. M. Yarosh, B. L. Nichols, E. A. Hirst, J. W. Michel, and W. C. Yee.
Available from the National Technical Information Service as ORNL-4797, $3.00 in paper copy, $0.95 in microfiche. Technical Report ORNL-4797, July 1972. 54 p, 21 fig, 14 tab, 141 ref. Contract W-7405-eng 26.

Descriptors: *Heated water, *Agriculture, *Fish harvest, Thermal powerplants, Nuclear powerplants, Thermal pollution, Fish, Fish hatcheries, Foods, Temperature, Greenhouses, Laboratory tests, Water pollution, Powerplants, Aquaculture.
Identifiers: *Heat utilization, Heat marketing, Seafood, Food production, Hog production, Waste heat, Thermal discharges.

Present steam power plants in the United States discharge as waste heat, energy equivalent to almost twice their total generating capacity (300,000 MWe.). Productive uses of this energy degraded in the form of heat are discussed. In agriculture, thermal effluents potentially can be used to promote rapid plant growth, improve crop quality, extend the growing season, and prevent damage due to temperature extremes. The use of heated effluents to improve the yields and productivity for fish and seafood species is receiving attention in this country and abroad. The development of extensive aquacultural facilities appears to have the potential for revolutionizing the production of fish and seafood in much the same manner as was production in the poultry industry. Both laboratory and large scale studies and practices are presented including criteria for site selection from the standpoint of minimum environmental impact. (Oleszkiewicz-Vanderbilt)
W73-00069

HOT AIR RECIRCULATION BY AIR COOLERS,
Hudson Products Corp., Houston, Tex.
A. Y. Gunter, and K. V. Shipes.
Chemical Engineering Progress, Vol 68, No 2, p 49-58, February 1972. 18 fig, 9 ref.

Descriptors: *Air, *Cooling, *Heat transfer, Air circulation, Mathematical models, Smoke, Mathematics, Wind, Testing, Environmental engineering, Chemical engineering, Design, Design criteria.
Identifiers: *Hot air recirculation, *Air coolers, Fans, Forced draft cooling, Induced draft cooling, Field tests, Smoke tests.

Equations are presented that provide the design engineers with reasonable tests to determine the possibility of hot air recirculation. Additional field test data under rigorous conditions are needed to refine the equations. The smoke test described is cited as a useful visual tool for analysis of hot air recirculation problems. Forced draft air coolers are more susceptible to recirculation than induced draft due to low exit velocities. Using reasonable care and the equations presented, air cooled installations may be economically designed to substantially eliminate air recirculation. (Oleszkiewicz-Vanderbilt)
W73-00079

THERMAL ADDITION - PLANNING FOR THE FUTURE,
White Fish Authority, West Kilbride (Scotland). Marine Fish Cultivation Unit.
C. Nash.
Chesapeake Science Vol. 10, No. 3 and 4, p 279, September-December 1969.

Descriptors: *Cooling, *Heated water, *Research priorities, *Thermal pollution, Water pollution, Thermal powerplants, Powerplants, Fisheries, Temperature, Outlets, Agriculture, Aquiculture.
Identifiers: *Waste heat utilization.

Even though little can be done with many existing power plants, certain proposals for immediate consideration and research can be made. 1. Following recent work in Great Britain and the Soviet Union, the concept of aquaculture in the discharge water should be accepted. This would mean the immediate building of experimental farm sites with provisions for extending the facilities to a pilot and possibly commercial scale. 2. Intensive engineering studies on the design of outlet systems should be made, particularly for the reduction of temperature and volume by using branched outlets for greater dispersal. 3. Engineering studies on the design and usefulness of open outlet systems through artificially aerated lagoons and ponds should be started. (Oleszkiewicz-Vanderbilt)
W73-00082

NUCLEAR SAFETY: RESPONDING TO THE CRITICS.

Power Engineering, Vol. 74, No. 5, p 26-34, May 1970. 11 fig.

Descriptors: *Nuclear powerplants, *Environmental effects, *Safety, Regulations, Radiation, Fallout, Design criteria, Accidents.
Identifiers: *Emission standards, Atomic Energy Commission, Federal Radiation Commission, Guidelines.

An interview concerning the guidelines, standards, and regulations covering nuclear power generation is presented. The discussion was recorded on tape and is printed in dialogue fashion is presented. The participants were Dr. C.K. Beck, Paul Tomkins, David McElroy, Wayne Carbiener, and Dr. Samuel Levy. The topics discussed include: (1) the general background of radiation protection standards; (2) the AEC's role as a regulator; (3) the keying of the efforts of the builder of nuclear systems with the efforts of other parties in the nuclear energy picture; (4) the search for public acceptance of installation locations; (5) the conceivable reactor malfunctions; (6) the special emphasis placed on safety; (7) the severe communications problems that exist between the nuclear industry and the general public; (8) the risk-benefit concept; (9) the validity of the present established emission standards; (10) the importance of not exceeding the maximum allowance; (11) the desire to let the people vote for different standards; (12) the design basis accident; and (13) the relationship between safety and reactor design. (Osborne-Vanderbilt)
W73-00084

INTERNATIONAL SYMPOSIUM ON MODELLING TECHNIQUES IN WATER RESOURCES SYSTEMS.
For primary bibliographic entry see Field 06A.
W73-00090

WATER QUALITY MODELLING: STATE-OF-THE-ART,
Department of the Environment, Ottawa (Ontario).
R. L. Pentland, P. J. Reynolds, and A. K. Biswas.
In: Proceedings (Vol. 3), International Symposium on Mathematical Modelling Techniques in Water Resources Systems, Canadian Ministry of the Environment, p 481-496, 1972. 8 equa, 40 ref.

Descriptors: *Water quality control, *Pollution abatement, Water pollution treatment, *Waste treatment, *Management, *Mathematical models, Decision making, Economic analysis, Costs, Optimum development plans, Simulation analysis, Systems engineering, Systems analysis, Linear programming, Dynamic programming, Dissolved oxygen, Biochemical oxygen demand, Streams, Rivers, Flow.
Identifiers: Differential equations, Cost minimization, Streeter-Phelps equation.

An extensive, detailed discussion of the state-of-the-art in water quality modelling is presented. The application of mathematical modelling techniques to water quality management can significantly aid the decision-maker to arrive at better decisions than otherwise possible by broadening his information base, by predicting the consequences of several alternative courses of action, or by selecting a suitable course of action which will accomplish a prescribed result. The role of the water quality model in the design of alternative waste abatement measures is evaluated and types of water quality models are distinguished. Various types of simulation and optimization models and their recent use are surveyed. Simulation methods provide the analytical framework required to estimate the impact of various planning and management strategies on river quality; future research in water quality simulation models will likely attempt to provide a better description of ecological processes. After completion of system representation, optimization models are used to screen possible courses of action and perform cost minimization to meet stream standards. The decision models discussion centers around the least cost solution in terms of treating the waste load entering the watercourse. Linear, non-linear, and dynamic programming models are evaluated and case studies are cited. (See also W73-00090) (Bell-Cornell)
W73-00091

MULTI-DISCIPLINARY MODELLING OF WATER RESOURCES SYSTEMS,
Technion - Israel Inst. of Tech., Haifa. Lowdermilk Faculty of Agricultural Engineering.
For primary bibliographic entry see Field 06A.
W73-00092

THE SAINT JOHN STUDY: AN EXAMPLE OF COMPLEMENTARY USAGE OF OPTIMIZATION AND SIMULATION MODELLING IN WATER RESOURCES PLANNING,
Acres Consulting Services Ltd., Niagara Falls (Ontario). Applied Mechanics Dept.
For primary bibliographic entry see Field 06A.
W73-00094

THE TRENT RIVER MODEL - AN AID TO MANAGEMENT,
Water Resources Board, Reading (England). Research Div.
For primary bibliographic entry see Field 06A.
W73-00096

MATHEMATICAL MODELS FOR WATER MANAGEMENT IN ONTARIO, STATUS OF THE ART, 1971,
For primary bibliographic entry see Field 06A.
W73-00099

ENVIRONMENT CANADA,
Department of the Environment, Ottawa (Ontario). Policy Planning and Research Service.
For primary bibliographic entry see Field 06A.
W73-00100

UNIVERSITY OF CINCINNATI URBAN RUNOFF MODEL,
Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
C. Papadakis, and H. C. Preul.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY10, Paper 9298, p 1789-1804, October 1972. 5 fig, 1 tab, 27 ref, append.

Descriptors: *Urban hydrology, *Urban runoff, *Routing, *Mathematical models, *Model studies, Storm runoff, Rainfall-runoff relationships, Urbanization, Urban drainage, Storm drains, Hyetographs, Terrain analysis.
Identifiers: *Cincinnati (Ohio).

A model was developed to provide a reliable method for obtaining the hydrograph of runoff at any selected point in a sewer system for any given rainfall. This is accomplished by simulating separately the processes involved during a rainfall: infiltration, depression storage, overland flow, gutter flow, and routing through sewers. The model uses independent hydraulic and hydrologic principles and equations and combines the processes sequentially. The output of this mathematical model may be helpful in the management of existing sewer systems. It also should be useful in the design of new sewer systems. The model is intended for an urban watershed of at least several hundred acres or more in area; however, it may be applied to any size by appropriate scaling. The input information required for the simulation of the rate of hydrologic runoff includes a rainfall hyetograph and data from topographic maps or aerial photographs, or both. (Knapp-USGS)
W73-00118

WATER QUALITY STANDARDS SUMMARY FOR INTERSTATE WATERS IN THE COMMONWEALTH OF PENNSYLVANIA.
Environmental Protection Agency, Philadelphia, Pa. Region III; and Pennsylvania Dept. of Environmental Resources, Harrisburg.
Environmental Protection Agency-Pennsylvania Department of Environmental Resources, Doc. No. 42-001 1972. 53 p, 1 fig, 9 tab, 4 append.

Descriptors: *Water quality standards, *Interstate rivers, *Pennsylvania, *Water quality act, *Water quality control, Water pollution control, State governments, Federal government, Pollution abatement, Regulation, Municipal wastes, Industrial wastes.

The standards for interstate waters adopted by the Commonwealth of Pennsylvania and approved by the U.S. Environmental Protection Agency in October 1971 are presented. The standards consist of three major components: (1) designation of the uses which interstate waters are to serve, (2) specification of narrative and numerical criteria to protect and enhance water quality, and (3) specifications of a plan of implementation and enforcement, including treatment and control requirements for municipal, industrial, and other wastes discharged to or affecting interstate waters. All three of these components are discussed. (Woodard-USGS)
W73-00134

A COMPARATIVE STUDY OF STATE WATER POLLUTION CONTROL LAWS AND PROGRAMS,
North Carolina Water Resources Research Inst., Raleigh.
S. Heath, Jr.
Available from the National Technical Information Service as PB-212 534, $3.00 in paper copy, $0.95 in microfiche. North Carolina Water Resources Research Institute, Raleigh, Report No. 42, (UNC-WRRI-72-42), January 1972. 265 p, 5 append.

Descriptors: *Water pollution control, *Regulation, Management, Institutional constraints, Administration, *Administrative agencies, *Water law, Maine, Michigan, New York, North Carolina, Pennsylvania, Virginia, State governments, Water quality standards.

This study of the water pollution control programs of Maine, Michigan, New York, North Carolina, Pennsylvania, and Virginia reviews the evolution of water pollution control programs in general and those of the states in particular. It offers insights into the laws, policies, and institutional arrangements of the six states. Strengths and weaknesses of state programs are noted. A check list is included of some of the best features of state water quality management programs as reflected in the actual experience of the study states. Appendices include a summary of the literature, laws, and programs of particular states, the text of North Carolina's statutes and regulations, illustration of the use of 'citizen suits' in Pennsylvania, and responses from the individual states as to current progress. (Howells-North Carolina)
W73-00142

EXISTING AUTOMATION, CONTROL AND INTELLIGENCE SYSTEMS FOR METROPOLITAN WATER FACILITIES,
For primary bibliographic entry see Field 05D.
W73-00145

COMPUTER AND CONTROL EQUIPMENT.
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00146

CONTROL OF COMBINED SEWER OVERFLOWS IN MINNEAPOLIS-SAINT PAUL,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00147

TASK 3 - AN INVESTIGATION OF THE EVALUATION OF AUTOMATION AND CONTROL SCHEMES FOR COMBINED SEWER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00148

SOCIAL AND POLITICAL FEASIBILITY OF AUTOMATED URBAN WATER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00149

URBAN SIZE AND ITS RELATION TO NEED FOR AUTOMATION AND CONTROL,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00150

MODEL OF REAL-TIME AUTOMATION AND CONTROL SYSTEMS FOR COMBINED SEWERS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00151

GUIDELINES FOR THE CONSIDERATION OF AUTOMATION AND CONTROL SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00152

RESEARCH AND DEVELOPMENT NEEDS FOR METROPOLITAN WATER INTELLIGENCE SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00153

METROPOLITAN WATER INTELLIGENCE SYSTEM, COMPLETION REPORT. PHASE I.
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00154

RAINWATER DILUTION OF PROCESS WASTES,
Badger Co., Inc., Cambridge, Mass.
For primary bibliographic entry see Field 05D.
W73-00156

POLLUTION CONTROL IN SEWERS,
Black and Veatch, Kansas City, Mo.
For primary bibliographic entry see Field 05D.
W73-00159

THE USE OF PLANT ANALYSES IN AGROCHEMICAL MAPPING OF IRRIGATED SOILS FOR COTTON,
For primary bibliographic entry see Field 03F.
W73-00171

PREDICTIVE METHODS FOR FOULING BEHAVIOR,
Heat Transfer Research, Inc., Alhambra, Calif.
J. Taborek, T. Aoki, R. B. Ritter, J. W. Palen, and J. G. Knudsen.
Chemical Engineering Progress, Vol 68, No 7, p 69-78, July 1972. 17 fig, 9 ref.

Descriptors: *Cooling, *Fouling, *Mathematical models, Temperature, *Forecasting, Analytical techniques, Cooling towers, Water treatment, Boiler feed water, Statistics.
Identifiers: *Fouling behavior, Fouling resistance.

The need for predictive methods for fouling behavior of industrial streams, which would include the effects of controllable variables affecting the fouling process, is obvious. The economic advantages can be considerable and have been largely recognized by the industry. An attempt has been made to demonstrate the development of a semi-generalized predictive method for cooling tower water fouling, based on a large set of data and deductions from visual observations. No claim is made for general applicability of the relations for the deposition and removal functions. On the contrary, it appears certain that all the major functions influencing fouling will be unique in character for each type of fouling. The hard-to-define and elusive variables, like the shear strength of the fouling layer, the 'sticking probability' of the particles, and their affinity to a particular type of surface, will be sensitive and change substantially between various substances and their interactions - such as crystallization under simultaneous effect of suspended particles and chemical reaction fouling. (Oleszkiewicz-Vanderbilt)
W73-00218

CLARIFICATION OF AMMONIUM POLYPHOSPHATE FERTILIZER SOLUTIONS,
Tennessee Valley Authority, Muscle Shoals, Ala.
A. W. Frazier, R. M. Scheib, and R. D. Thrasher.
J Agric Food Chem. Vol 20, No 1, p 138-145. 1972. Illus.
Identifiers: *Ammonium polyphosphate, *Clarification, *Fertilizers, Fluorine, Metallic impurities, Phosphates, Sludge.

Wet-process phosphoric acids contain metallic impurities, mostly Mg, Al, and Fe that were dissolved in the acidulation of the parent phosphate rock. Ammonium polyphosphate fertilizer solutions prepared from these acids may deposit sludges of phosphates of the metallic impurities that interfere seriously with the mechanical handling of the liquids. Formation of the sludges often can be prevented, however, by addition of fluorine as either fluoride or fluosilicate. The proper amount of fluorine is related to the amount of each of the metallic impurities present and to the fraction of the phosphate present as pyrophosphate. More highly condensed phosphates retard the formation of sludge, but their effect disappears when they hydrolyze to pyro- and orthophosphate.--Copyright 1972, Biological Abstracts, Inc.
W73-00219

AN ADVANCED OPTIMIZATION TECHNIQUE FOR TURBINE, CONDENSER, COOLING SYSTEM COMBINATIONS,
Westinghouse Electric Corp., East Pittsburgh, Fuels and Energy Systems. Pa.
For primary bibliographic entry see Field 05D.
W73-00220

NEW APPROACH TO POWER PLANT SITING,
Commonwealth Association, Inc., Jackson, Mich. Environmental Systems Div.
J. D. Calvert, and W. L. Heilman.
Journal of the Power Division, American Society of Civil Engineers, Vol 98, No PO1, Paper 8981, p 93-102, June 1972. 1 fig.

Descriptors: *Powerplants, *Sites, *Regional development, *Land use, Statistical methods, Systems analysis, Zoning, Hydroelectric power, Thermal powerplants, Environmental engineering, Management, Regulations, Public benefits.
Identifiers: *Site selection, *Regional planning, *Impact prediction, Statistical analysis, Systems engineering, Matrices (Mathematics), Public acceptance.

The demand for environmental awareness involves a very comprehensive, broad scale map searching technique to locate site possibilities. A repetitive, but systematic, evaluation and selection procedure is then applied. This technique is based upon an increasing degree of evaluation as the number of remaining site possibilities is reduced through a series of site rating applications. The rating system consists of numerical evaluation of site characteristics in three general categories, namely: (1) engineering feasibility; (2) environmental effects and public acceptance; and (3) economic considerations. Weightings are applied to the numerical values in each category and the weighted values are then combined to obtain an overall site rating number. This number is then viewed in comparison with similar numbers derived for other sites to arrive at a priority listing of site development possibilities. (Oleszkiewicz-Vanderbilt)
W73-00223

ENVIRONMENTAL ASPECTS OF SITE SELECTION,
Harza Engineering Co., Chicago, Ill.
E. F. Dudley.
Journal of the Power Division, American Society of Civil Engineers, Vol 98, No PO1, Paper 8971, p 21-28, June 1972.

Descriptors: *Powerplants, *Sites, *Regional development, *Land use, *Planning, Natural resources, Air pollution, Water pollution, Water resources, Power, Design, Design standards, Environmental engineering.
Identifiers: *Site surveys, *Site selection, *Impact prediction.

New power plants can be built with little, if any, detrimental environmental effects if sufficient thought, planning, and study are given to potential problems before rather than after the project is designed and constructed. Environmental change does not necessarily mean environmental degradation. Engineers and others responsible for development must learn to recognize the potential environmental impacts of their projects. Environmental scientists must develop more specific objectives and criteria for environmental protection so that they may be applied by engineers during project formulation. Only if the mutual interrelationships between engineering and environmental considerations are considered at the beginning of the planning stage can a final design be developed that is both compatible with the local environment and efficient for its intended function. (Oleszkiewicz-Vanderbilt)
W73-00224

COOLING WATER REQUIREMENTS FOR THE GROWING THERMAL GENERATION ADDITIONS OF THE ELECTRIC UTILITY INDUSTRY,
Westinghouse Electric Corp., East Pittsburgh, Pa. Power Systems Planning.
L. G. Hauser.
Proceedings of the American Power Conference, Vol 31, p 477-483, 1969. 6 fig, 3 tab.

Descriptors: *Cooling water, *Cooling, *Thermal pollution, *Economics, Thermal powerplants, Nuclear powerplants, Electric power industry, Peak power, Fossil-fuels, Nuclear reactors, Cooling towers, Sites.
Identifiers: *Power generation, *Electric utility industry, Heat assimilative capacity, Cooling ponds, Dry cooling towers, Heat rejection.

This overview analysis of the thermal discharge problem facing the power industry assesses expected trends in the siting of steam electric plants. The kilowatt hour forecast, types of generation used, thermal discharge growth forecast and methods of heat dissipation (with a cost comparison included) are discussed as to their effect on the plant site preferred. Proper waste heat management is a vital necessity to protect the ecological systems of the continent. The economic penalties associated with alternative cooling systems will not deter the electrical generation growth in this country. Within ten years a majority of the new generation additions will be utilizing supplementary cooling apparatus. (Oleszkiewicz-Vanderbilt)
W73-00227

NONLINEAR DYNAMIC ANALYSIS OF COOLING TOWER,
Harza Engineering Co., Chicago, Ill.
For primary bibliographic entry see Field 08B.
W73-00228

DESIGN AND OPERATION OF PROCESS WASTE HEAT BOILERS,
Struthers Wells Corp., Warren, Pa.
For primary bibliographic entry see Field 08A.
W73-00229

THE GEYSERS GEOTHERMAL POWER PLANT,
Pacific Gas and Electric Co., San Francisco, Calif.
J. P. Finney.
Chemical Engineering Progress, Vol 68, No 7, p 83-86, July 1972. 2 fig, 4 ref.

Descriptors: *Geysers, *Thermal powerplants, *Geothermal studies, Turbines, Powerplants, Electric power production, Thermal pollution, Steam, Pacific Coast Region, California.
Identifiers: *Geysers Powerplant, *Geothermal powerplants.

The generation of electric power has proven commercially successful at the Geysers. Power production costs there compare favorably with those of PG and E's latest supercritical fossil units. Attention to design, operation, and maintenance have overcome problems associated with particulate matter in the steam and the corrosiveness of the condensate. Additional generating capacity is scheduled each year through 1974, at which time it will total 502,000 kw., making the Geysers power plant the largest geothermal power installation in the world. Beyond that, additional capacity will continue to be installed as additional steam reserves are developed. (Oleszkiewicz-Vanderbilt)
W73-00230

UNDERSTANDING LAKES AND LAKE PROBLEMS,
Wisconsin Univ., Madison. Cooperative Extension Programs.
S. M. Born, and D. A. Yanggen.
Publication No. G2411, May 1972. 41 p, 23 fig, 29 ref.

Descriptors: *Lakes, *Eutrophication, Ecosystems, Ecology, Water quality, Legal aspects, Hydrologic cycle, Wisconsin, Water pollution sources, Water pollution control, Legislation, Regulation, Social participation.
Identifiers: Wis. Dept. of Natural Resources.

This article is oriented to the general public. It contains illustrations and discussions of lake processes, problems, and some solutions. The aquatic ecosystem is complex and its components interrelated, life forms depending upon one another for existence. The contrast between natural aging of lakes and man-induced aging is pictured. While the amount of surface water is relatively fixed, human pressures on lakes are skyrocketing. The principal water quality problems encountered in lakes come from the processes of

contamination, sedimentation, and accelerated eutrophication. Careless shoreland usage can increase the amount of eroded material that enters and gradually fills a lake. Pollution from septic tanks and surface runoff can impair water quality. Restricting nutrients to lakes by diverting waste waters improves the lakes, but increasing costs of advance waste treatment must be met. Lake rehabilitation requires solid technical expertise, money, and a 'no-guarantee' kind of patience. Citizen interest, understanding, and cooperation are vital to undertaking such programs which must be carried on in conjunction with the appropriate federal and state agencies. (Jones-Wisconsin)
W73-00239

NEW APPROACHES FOR POLLUTION CONTROL,
Pennsylvania State Univ., University Park. Dept. of Soil Physics.
L. T. Kardos.
In: 'The Shape of Things to Come,' Proceedings 26th Annual Meeting, Soil Conservation Society of America, August 15-18, 1972, Columbus, Ohio, p 220-226. 5 tab.

Descriptors: *Water pollution control, *Waste water disposal, *Filtration, *Sewage effluents, Nutrients, Water purification, Soils, Forestry, Crop production, Recycling, Agriculture, Pennsylvania, Phosphorus, Nitrogen, Crop response, Fertilization.

Soil can be utilized as a 'living filter' with the higher plant growth an integral part of the system and complementary to the microbiological and physiochemical components in the soil. By diverting sewage plant effluents from streams to the 'living filter,' the nutrients which had undesirable effects in water bodies enhance crop and fiber production. The two nutrients, phosphorus and nitrogen, primarily responsible for eutrophication, can be removed from waste water by application of two inches, at wekly intervals, to the land. The biological systems remain in balance and only 129 acres are required for every million gallons of effluent per day which needs to be diverted from the streams or lakes. Data obtained indicate that, in the absence of severe erosion, agriculture does not contribute important amounts of phosphorus toward eutrophication over and above that which normally leaches from the geological substratum. Close controls are necessary to avoid breakthrough of excessive amounts of nitrogen into groundwater supplies. With proper management, agricultural lands can provide a waste disposal system which can minimize pollution of water resources. (Jones-Wisconsin)
W73-00244

URBAN RUNOFF,
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 03D.
W73-00262

DESTRATIFICATION OF LAKES BY SELECTIVE WITHDRAWAL METHODS,
Wisconsin Univ., Madison. Water Resources Center.
For primary bibliographic entry see Field 02H.
W73-00264

MEASUREMENT AND MANAGEMENT ASPECTS OF WATER TOXICOLOGY: THE MALIBU WATERSHED, A MIXED RESIDENTIAL AND WILDERNESS AREA,
California Univ., Los Angeles. School of Public Health.
For primary bibliographic entry see Field 05B.
W73-00268

A STUDY OF LEGAL AND ADMINISTRATIVE PRACTICES RELATING TO LAKE POLLUTION IN THE NORTHEAST,
Connecticut Univ., Storrs. Inst. of Water Resources.
For primary bibliographic entry see Field 06E.
W73-00271

BIOLOGICAL CONTROL OF ACID MINE POLLUTION,
Harvard Univ., Cambridge, Mass.
F. Walsh, and R. Mitchell.
Journal Water Pollution Control Federation, Vol. 44, No. 5, p 763-768, May 1972. 2 fig, 3 tab, 15 ref.

Descriptors: *Acid mine water, *Biocontrol, *Water pollution control, *Iron bacteria, *Acidity, Acid mine drainage, Environmental effects, Aerobic bacteria, Pyrite, Biological properties, Water quality control, Coal mine wastes, Water pollution sources, Iron, Cultures, Thiobacillus ferrooxidans, Electron microscopy, Chemical properties.
Identifiers: *Heterotrophic bacteria, Thiobacillus novellus, Thiobacillus thioparus, Thiobacillus intermedius, Thiobacillus thiooxidans, Sphaerotilus natans, Gallionella ferruginea, Culture media.

Three possible biocontrols were presented to reduce the acidity in acid mine drainage, based on disrupting the succession of iron bacteria by upsetting the activity of the acid-tolerant stalked iron bacterium in this succession. The three controls include: (1) partially neutralizing acid mine drainage to pH 4.3 to inhibit the stalked bacteria and Thiobacillus ferrooxidans; (2) removing attachments for the stalked-bacteria at the site of pyrite degradation by additions of surface-active agents to influence mine waters; (3) adding heterotrophic bacteria capable of growth on a medium with stalked iron bacteria as the sole carbon source. Characteristics of the iron bacteria Thiobacillus spp., Gallionella spp., and Sphaerotilus natans in relation to acid mine pollution were also described. (Long-Battelle)
W73-00300

A LOW TEMPERATURE CLEANUP PROCEDURE FOR PESTICIDES AND THEIR METABOLITES IN BIOLOGICAL SAMPLES,
Department of National Health and Welfare, Ottawa (Ontario). Food and Drug Research Lab.
For primary bibliographic entry see Field 05A.
W73-00358

WATER QUALITY MANAGEMENT FOR METROPOLITAN WASHINGTON: THE NORTHERN VIRGINIA PLAN.
Northern Virginia Planning District Commission, Falls Church; and Metropolitan Washington Council of Governments, D.C.
For primary bibliographic entry see Field 05D.
W73-00449

TOWN OF PORTAGE LAKE, MAINE, PRELIMINARY DESIGN REPORT, POLLUTION CONTROL PROGRAM.
Jordan (Edward C.) Co., Inc., Portland, Maine.

Town of Portage Lake, Maine, February 1971. 39 p, 8 fig, 7 tab.

Descriptors: *Water pollution control, *Project planning, *Sewage treatment, *Sewage disposal, Municipal wastes, Maine, Sprinkler irrigation, Oxidation lagoons, Soil disposal fields, Sewers, Vacuum pumps, Vacuum apparatus, Vacuum breakers, Finance, Use rates, Sewerage, Pumping plants, Alternative planning.
Identifiers: *Portage Lake (Maine), *Vacuum wastewater collection system, Aroostook County.

Recognizing that it is potentially the only pollution source of the watershed upstream of Eagle Lake, the Town of Portage Lake, Maine authorized this pollution control program design study. The town has a winter population of 500 and a summer population of 1400, due to lake property dwellings. The following is recommended: (1) the use of the Town's treatment plant for both the town and the property bordering Portage Lake; (2) a vacuum intercepting and collecting system for the lake property; (3) standard gravity collector sewers for the Town; (4) oxidation ponds capable of holding a full winter's supply of effluent; and (5) a spray irrigation system for summer land disposal of all wastes. Spray irrigation was chosen because: (1) it eliminates discharge of effluent into a water course; (2) spray irrigation can be accomplished at no increase in capital cost over alternate methods; (3) operating and maintenance costs are cheaper than for alternate systems; and (4) less skilled labor can be used in the operation of the oxidation pond than with the other systems. Total cost of the project is $1,111,000 with outside funding paying all but $328,700. Operating and maintenance costs are estimated at $11,000. A total of $30,000 must be raised annually by the Town to support the system, with a proposed property tax at $3.30 per $1000 valuation and a user charge of about $70 per year. (Poertner)
W73-00461

SNAGGING AND CLEARING PROJECT ON GALLINAS RIVER, LAS VEGAS, NEW MEXICO (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Albuquerque, N. Mex.
For primary bibliographic entry see Field 04D.
W73-00462

DOCUMENTS FOR THE U.N. CONFERENCE ON HUMAN ENVIRONMENT, STOCKHOLM, JUNE 5-16, 1972--PART II.
Department of State, Washington, D.C.
For primary bibliographic entry see Field 06E.
W73-00466

PALZO RESTORATION PROJECT, ILLINOIS (DRAFT ENVIRONMENTAL STATEMENT).
Forest Service (USDA), Milwaukee, Wis. Eastern Region.

Available from the National Technical Information Service as PB-207 061-D, $3.00 in paper copy, $0.95 in microfiche. February 23, 1972. 73 p, 2 map, 5 tab, 10 append.

Descriptors: *Illinois, *Environmental effects, *Water pollution control, *Land reclamation, Water quality, Waste disposal, Pollution abatement, Vegetation establishment, Watershed management, Waste dumps, Landfills, Anaerobic digestion, Municipal wastes, Erosion control, Strip mines, *Strip mine wastes, Water pollution sources.
Identifiers: *Environmental Impact Statements, *Palzo (Ill).

The proposed project affecting Williamson, Saline, and Gallatin Counties, Illinois, will attempt to utilize treated municipal waste to reclaim approximately 312 acres of abandoned strip mined land which is presently causing severe water pollution problems. A pipeline will be used to transport the waste from a railhead to Palzo. The project deals with the application of anaerobically digested municipal waste on strip mined land. The expected environmental impact will be to significantly reduce the water pollution problem now associated with the tract as well as to control extensive erosion through establishment of vegetative cover. The long range environmental impact could be the reclamation of thousands of acres of strip mined land, resulting in an improvement in water quality throughout southern Illinois. Adverse environmental effects may include slight increases in the concentration of cadmium, chromium, nickel

and nitrates in the runoff. Alternatives are to do nothing, to cover acid producing shale with non-toxic materials, or to level to 15% slope, incorporate lime and fertilizer and seed to grasses. (Wheeler-Florida)
W73-00473

PORT EVERGLADES HARBOR, BROWARD COUNTY, FLORIDA (DRAFT ENVIRONMENTAL STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 08A.
W73-00477

WETLANDS.
Central Atlantic Environment Service, Washington, D.C.
For primary bibliographic entry see Field 06G.
W73-00479

MAINTENANCE OF NEWTOWN CREEK, NEW YORK, NAVIGATION PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.
For primary bibliographic entry see Field 08A.
W73-00484

MAINTENANCE OF GREAT SOUTH BAY AND PATCHOGUE RIVER, NEW YORK, NAVIGATION PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.
For primary bibliographic entry see Field 08A.
W73-00486

ENVIRONMENTAL PROBLEMS AND THE USE OF CRIMINAL SANCTIONS,
Southern Methodist Univ., Dallas Tex. School of Law.
J. S. Morris.
Land and Water Law Review, Vol 7, p 421-431, 1972. 68 ref.

Descriptors: *Federal Water Pollution Control Act, *Rivers and Harbors Act, *Water pollution control, *Law enforcement, Navigable waters, Oil pollution, Shores, Oil spills, Air pollution, Environmental control, Pollution abatement, Penalties, Permits, Legislation, Water pollution, Legal aspects, Political aspects, Social aspects, Economics, Water pollution abatement, Discharge (Water).

The history of the imposition of criminal and civil sanctions in federal and state pollution control statutes is examined. The Rivers and Harbors Act of 1899 provided civil and criminal penalties for the dumping of refuse into navigable waters. The Federal Water Pollution Control Act of 1970 attaches criminal liability only where a criminal intent can be shown. Department of Justice guidelines restrict the use of the 1899 statute to discharges which are accidental or infrequent, whereas the 1970 statute is to be used in the abatement of continuing pollution. The use of the qui tam action under the 1899 Act also is discussed. Comparative statistics are included on the various sanctions provided by state pollution control statutes. The changed role that remedies are expected to play in the future is examined. Use of criminal penalties will decline as pollution is looked at more as a violation of economic necessities than a violation of moral values. Civil remedies will be more and more in use and criminal penalties will be used only as additional leverage. (Bradley-Florida)
W73-00493

QUI TAM ACTIONS AGAINST POLLUTERS OF NAVIGABLE WATERS: AN ATTEMPTED AUGMENTATION OF REFUSE ACT ENFORCEMENT,
J. C. Cernkovich.
St. Mary's Law Journal, Vol 3, p 278-293, 1971. 99 ref.

Descriptors: *Judicial decisions, *Rivers and Harbors Act, *Law enforcement, *Common law, Constitutional law, Jurisdiction, Environment, Penalties (Legal), Legislation, Federal Water Pollution Control Act, Navigable waters, Public rights, Water permits, Administrative agencies, Adoption of practices, Political aspects, Political constraints.
Identifiers: *Refuse Act, *Environmental Protection Agency, *Qui tam action.

The development of Refuse Act enforcement through qui tam actions is reviewed. Such actions have been recognized in U.S. case law. The historical background and pertinent statutory provisions which support qui tam are discussed. In support of allowing these actions under the Refuse Act, recent federal cases that have expanded the standing of private citizens to enforce federal environmental statutes are cited. The public policy rationale as an argument, as well as the supportive case law dealing with statutory authorization, silence, or denial of the right to maintain qui tam suits in the name of the government are reviewed. The total refusal of the federal courts that have considered this question to allow such actions is discussed. Finally, recent cases denying citizen enforcement of the Refuse Act are reveiwed. Limited enforcement of the Refuse Act by the federal government and the interplay of various federal agencies also are discussed. Citizen suits serve a valuable purpose in bringing to light the government's failure to enforce legislation and future legislation should authorize greater citizen participation in enforcement. (Bradley-Florida)
W73-00494

ENVIRONMENTAL RIGHT OF ACTION--A SUGGESTED STATUTE AND COMMENTARY,
J. P. Zucker.
Harvard Civil Rights, Civil Liberties Law Review, Vol 7, p 520-557, 1972. 153 ref.

Descriptors: *Legislation, *Law enforcement, *Judicial decisions, Legal aspects, Water law, Public rights, Jurisdiction, Local governments, Water pollution, Water pollution control, Watercourses (Legal aspects), pollution abatement, Legal review, Institutional constraints.
Identifiers: *Standing (Legal) injunction, Administrative remedies, Public trust doctrine, Nuisance (Legal aspects).

The shortcomings of current legal and institutional means of enforcing anti-pollution laws are discussed. The problems and limitations of private action based on nuisance law and the recently revived public trust doctrine are discussed. The failures of administrative and voluntary efforts are also noted. As a blueprint for citizen participation in the environmental lawmaking process, a Model Environmental Right of Action statute is proposed. Section 1 of the act covers definitions, including abatement and harm to the environment. Section 2 deals with Administrative Proceedings, and the commentary which follows states that the statutory intent of the section is to secure a proper balance between administrative convenience and environmental protection. Section 3 covers Standing, Burden of Proof, and Standards of Relief. The commentary to this section devotes considerable attention to expanding citizen's rights to bring actions, and the attempt to eliminate discretionary enforcement. The last section of the model act covers defenses to actions, pleading in the alternative, and court approval before dismissal, settlement, or compromise of the suit. The legal doctrines set forth in the proposed legislation are not revolutionary; most of them so resemble existing concepts that they could be adopted by a more responsive judiciary without the need of enabling legislation. (Bradley-Florida)
W73-00495

REHABILITATION OF THE NOLICHUCKY PROJECT (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Tennessee Valley Authority, Chattanooga, Tenn. Office of Health and Environmental Science.
For primary bibliographic entry see Field 08A.
W73-00496

OCEAN OUTFALL EXTENSION PROJECT (WPC-CAL-468), CARMEL SANITARY DISTRICT, CARMEL, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, San Francisco, Calif.

Available from the National Technical Information Service as PB-202 585-F, $3.00 in paper copy, $0.95 in microfiche. March 8, 1972. 69 p, 4 fig, 59 ref, 2 append.

Descriptors: *California, *Environmental effects, *Waste water disposal, *Outfall sewers, *Waste water (Pollution), Sewage disposal, Sewage effluents, Oceans, Water quality control, Water quality, Bays, Discharge lines, Beaches, Pollution abatement, effluents, Marine plants, Marine animals, Waste disposal, Water pollution control, Water pollution, Conveyance structures.
Identifiers: *Environmental Impact Statements, *Carmel (Calif).

This project involves the Carmel Sanitary District's construction of an ocean outfall sewer extension in Carmel Bay off the central coast of California. The project is an interim measure to relieve existing pollution problems. At the present discharge point the existing biological damage, health hazard, and unesthetic condition will be eliminated. The beaches will remain open due to the increased reliability of contamination control provided by the project. Any abnormal bay water salinity and temperature conditions, at the present outfall location, created by the current discharge will be eliminated. Consequences of the outfall construction include the temporary removal of plant and animal life in the path of the trench excavation and possible damage to portions of the Carmel Canyon wall as the result of blasting. The presence of the project's waste water effluent discharge will impair the value of this particular location, which is in a proposed enlargement of the Point Lobos Underwater Reserve, as a scientific laboratory. Additional long-range alternate solutions are currently under study by a regional water quality planning agency. Included are comments from interested agencies. (Ellis-Florida)
W73-00497

GULF INTRACOASTAL WATERWAY, OFFATTS BAYOU, TEXAS (NAVIGATION) (FINAL ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 08A.
W73-00507

OIL COLLECTION DEVICE,
C. J. Brittingham.
U.S. Patent No. 3,664,505, 3 p, 10 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 898, No 4, p 1249-1250, May 23, 1972.

Descriptors: *Patents, *Oil spills, *Oil pollution, Pollution abatement, Equipment, Separation techniques, Water pollution control, Water pollution treatment.

A vessel is provided with a V-shaped longitudinal frame depending from and extending along the underside of the hull. The mouth of the frame is ad-

jacent to the forward end of the vessel and the neck of the frame is located near the stern of the vessel beneath a pressure chamber. The bottom of the hull forms a top for the frame except for a relatively narrow area adjacent to the top edges of the frame which is enclosed by a false hull to form a riser chamber. The oil/water mixture enters the mouth of the frame as the vessel moves over the slick. In the pressure chamber separation takes place. Oil free water is discharged and the oil retained. (Sinha-OEIS)
W73-00513

METHOD AND APPARATUS FOR REMOVING CONTAMINANTS FROM WATER,
Standard Oil Co. of Indiana, Chicago, Ill.
H. E. Ries, Jr. and J. Gabor.
U. S. Patent No 3,587,860, 5 p, 2 fig, 12 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 887, No 5, p 1585, June 28, 1971.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Flotsam, *Pollution abatement, Equipment, Water pollution control, Water pollution treatment.

Closed cylinders forming drums are partially submerged in the fluid to be cleaned. The drums rotate about their longitudinal axes and the long axes of the drums are at right angles to the direction of flow of the water. The drums rotate in opposite directions. One drum may have a surface of organophilic material, another a hydrophilic surface. The first will remove heavy viscous oils while the second removes light oils. The cylinders may be rotated by any power means such as an electric motor or other types of prime movers directly or indirectly connected to the cylinders. (Sinha-OEIS)
W73-00515

PROCESS OF BURNING-OFF OIL ON THE SURFACE OF WATER BASINS,
Atlas Copco A.B., Stockholm (Sweden) (assignee).
A. Molin, and O. Carlsson.
U. S. Patent No. 3,586,469, 3 p, 9 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 887, No 4, p 1253, June 22, 1971.

Descriptors: *Patents, *Oil spills, *Oil pollution, Treatment, Water pollution control, Water pollution treatment, *Pollution abatement.

A method is described for combating oil drifting about as a layer on the surface of a body of water. It consists of blowing jets of combustion sustaining gas under pressure against the oil in a limited area. The area is ignited and the oil is destroyed. (Sinha-OEIS)
W73-00519

APPARATUS FOR SEPARATING OIL FROM WATER SURFACE,
Ocean Design Engineering Corp., Long Beach, Calif. (assignee).
R. E. Hunter.
U. S. Patent No. 3,581,899, 4 p, 3 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 887, No 1, p 151, June 1, 1971.

Descriptors: *Patents, *Oil pollution, *Oil spill, *Pollution abatement, Equipment, Separation techniques, Water pollution treatment, Water pollution control.
Identifiers: *Oil skimmers, *Booms, Foam material.

Batches of open cell material such as foam are distributed over an oil spill area. The pore size is such that the material has an affinity for oil rather than water. The material which has become oil saturated is lifted mechanically from the water surface and moved along for compression in a separator. The entrapped oil is pressed out and the foam material is moved along for return to the water surface for reuse. The apparatus includes booms which can gather the distributed foam material toward a collection area where it is raised onto a floating platform with a pair of conveyors. A pair of helical screw compressors squeeze out the oil and the cleaned form material is conveyed to a pair of distributors. The recovered oil is collected in the vessel's bunkers. (Sinha-OEIS)
W73-00527

ULTRAVIOLET FLUORESCENT ANALYZER FOR MONITORING OF OIL IN DISCHARGE BALLAST,
S. I. Barrett.
U. S. Patent No. 3,581,085, 4 p, 4 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 886, No 4, p 975, May 25, 1971.

Descriptors: *Patents, *Oil water, *Oil pollution, *Pollution abatement, Equipment, Analytical techniques, *Discharge water, Water pollution, Water pollution treatment.
Identifiers: *Photocell, *Discharge ballast, *Ultraviolet fluorescent analyzer.

Ultraviolet light is passed through a sample jet of water, and the fluorescent visible light is measured by a filter-photocell combination angled to the incident beam. When the oil concentration in the discharge ballast is raised, the meter response may diminish because of the dark oil present, thus giving a false reading. A photocell or fluorescent indicator screen may be used as a warning device to indicate when the emerging ultraviolet light is obscured by excess quantities of oil. (Sinha-OEIS)
W73-00530

APPARATUS FOR SEPARATING AN OIL SLICK FROM A LARGE BODY OF WATER,
D. L. Peterson, and C. M. Cole.
U. S. Patent No. 3,661,263, 5 p, 5 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 898, No 2, p 482, May 9, 1972.

Descriptors: *Patents, *Oil spills, *Oil pollution, Separation techniques, Equipment, Water pollution, Water pollution treatment, *Pollution abatement.
Identifiers: Booms.

The V-shaped sweeper consists of a log boom which forms one arm and a barge which forms the other arm of the V. The oil slick is moved in the direction of the apex for delivery through a hull opening to a separator system on the barge. The oil is retained in a special compartment and the water is pumped overboard. (Sinha-OEIS)
W73-00536

LOG BOOM SYSTEM FOR SWEEPING OIL SLICKS FROM A LARGE BODY OF WATER,
D. L. Peterson, and C. M. Cole.
U. S. Patent No. 3,661,264, 5 p, 8 fig, 3 ref; Official Gazette of the United States Patent Office, Vol. 898, No 2, p 482, May 9, 1972.

Descriptors: *Patents, *Oil slicks, *Oil pollution, Separation techniques, Equipment, *Pollution abatement, Water pollution control, Water pollution treatment.
Identifiers: Booms.

A log boom will sweep oil slicks over a wide area of the water surface and push the oil by means of high pressure water jet streams away from the boom in the direction of the barge for collection. The boom is free to move vertically along the vessel side in addition to being capable of swinging freely and remain at the water surface ragardless of wave action or of the vessel ballast. (Sinha-OEIS)
W73-00538

APPARATUS FOR PREVENTING POLLUTION FROM OFFSHORE OIL WELLS,
E. G. Jones.
U. S. Patent No. 3,664,429, 3 p, 5 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 898, No 4, p 1230, May 23, 1972.

Descriptors: *Patents, *Pollution abatement, *Oil pollution, Separation techniques, Equipment, *Oil wells, *Oil fields, Water pollution, Water quality control.
Identifiers: Offshore oil wells, Oil catchers, Pollution prevention.

A closed container is provided with a truncated entrance throat area through which oil from one or more offshore oil wells is admitted. The oil strikes a front wall and ricochets or is deflected rearward so that when it falls by gravity it has cleared an upturned marginal edge portion of a bottom. The presence of a bottom which occupies a major portion of the lower extremity of the oil catching apparatus ensures that none of the oil will return to pollute the adjacent water. (Sinha-OEIS)
W73-00539

BARRIER FOR CONTROL OF SUBSTANCES IN BODIES OF WATER,
P. Preus, and C. E. Rosendahl.
U. S. Patent No. 3,579,994, 4 p, 4 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 886, No 4, p 728, May 25, 1971.

Descriptors: *Patents, *Barriers, *Aquatic animals, *Debris, *Shore protection, Equipment, *Pollution abatement, Beaches, Fishing, *Protection, Flotsam.

This barrier is intended for containing or excluding material or marine life in open bodies of water. It consists of interconnecting units with an inflatable articulated flotation device and a flexible skirt depending from it. The skirt has water ballasting pockets. The units are connected and may be towed by a vessel by means of a tow line and bridle. The tension for towing the barrier is transmitted through tapes. The bridle should be arranged so that towing forces are applied equally across the depth of the barrier predominantly by selecting the lengths of the bridle lines so that the angle of pull on each tape is minimal. It may be adapted for use near shore or in rough water. (Sinha-OEIS)
W73-00540

METHOD OF REMOVING FLOATING OIL FROM THE SURFACE OF A BODY OF WATER,
Standard Oil Co. of Indiana, Chicago, Ill. (assignee).
R. L. Yahnke.
U. S. Patent No. 3,578,585, 2 p, 1 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 886, No 3, p 387, May 11, 1971.

Descriptors: *Patents, *Oil spills, *Oil pollution, Pollution abatement, Equipment, Water pollution control, Water pollution treatment.
Identifiers: *Polyurethane.

A rotating cylinder having a porous outer layer made of polyurethane is partially submerged in the body of water. As it rotates, the polyurethane absorbs oil floating on the surface. A roller presses against the polyurethane to remove the oil. The oil collects in a trough placed adjacent to the cylinders periphery. (Sinha-OEIS)
W73-00541

AN ARGUMENT FOR THE OPEN OCEAN SITING OF COASTAL THERMAL ELECTRIC PLANTS,
National Marine Water Quality Lab., West Kingston, R. I.
For primary bibliographic entry see Field 05C.
W73-00623

PROFITS, JOINT COSTS AND WATER QUALITY CONTROL,
University of Southern Mississippi, Hattiesburg.
C. B. Housley.
Water Resources Bulletin, American Water Resources Association, Vol 8, No 4, p 679-684, August, 1972. 2 fig, 10 ref.

Descriptors: *Water quality control, Economics, *Cost analysis, Joint costs, Separable costs, Standards, Resources, Byproducts, Operations research.
Identifiers: *Fixed proportions, *Product markets, Inviaible hand, Governmental intervention, Economic prosperity.

This study investigates the conceptual measure of truth underlying attempts to justify the continuation of deposits of harmful wastes into our nation's waters. A rational case in favor of the discharge of industrial waste materials is described in terms of economic equilibrium in product markets. It is seen that, though the immediate feasibility or rationality of purifying all water is questionable, optimum resource usage cannot be achieved without government intervention. Nonetheless, strict and rigid regulation will affect the economy adversely. Excessive rigidity of standards could impose a burden on polluters that is greater than the cost to society which the damaging firm or individual is generating. The technological ability to create byproducts from waste materials needs time to advance; scientists have not developed inexpensive treatment methods which are totally effective either. However, too lenient regulation is also highly dangerous. Therefore, since it is desirable to maintain the quality of the environment and to preserve a reasonable degree of prosperity, a tradeoff of resources for money income is presently necessary. If a system of payments can be instituted, gains to society will increase, pollution will be abated, and conditions necessary for improvement of economic welfare will more nearly be satisfied. (Bell-Cornell)
W73-00639

06. WATER RESOURCES PLANNING

6A. Techniques of Planning

A MODEL FOR MANAGING RESERVOIR WATER RELEASES,
Kansas Agricultural Experiment Station, Manhattan.
For primary bibliographic entry see Field 04A.
W73-00089

INTERNATIONAL SYMPOSIUM ON MODELLING TECHNIQUES IN WATER RESOURCES SYSTEMS.

Proceedings held at Ottowa, Canada, May 9-12, 1972, (Vol. 3), Canadian Ministry of the Environment, A. K. Biswas, editor, p 481-777, 1972.

Descriptors: *Model studies, *Mathematical models, *Alternative planning, *Decision making, *Water quality control, *Management, *Simulation analysis, *Optimization, *Water resources development, *Computers.

Since the first computer simulation of a simplified river basin in 1962, much progress has been made in the application of modelling techniques to water resources policy planning and decision making. Scientists from every branch of this field came from all over the world to meet in a symposium to share and communicate their most recent findings. In this third volume of the proceedings, 10 articles present various aspects of current model studies. Optimization studies using linear and dynamic programming are presented, as well as stochastic model simulation studies. They cover a broad area of water policy planning, including economic modelling of the interrelationships between water and society, the artificial replenishment of subsurface water reserves, models representing the multidisciplinary aspect of water resources development, and Canada's environmental characteristics and problems. Water quality modelling plays the foremost role in this collection of articles. (See W73-00091 thru W73-00100) (Bell-Cornell)
W73-00090

WATER QUALITY MODELLING: STATE-OF-THE-ART,
Department of the Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 05G.
W73-00091

MULTI-DISCIPLINARY MODELLING OF WATER RESOURCES SYSTEMS,
Technion - Israel Inst. of Tech., Haifa. Lowdermilk Faculty of Agricultural Engineering.
N. Buras.
In: Proceedings (Vol. 3), International Symposium on Mathematical Modelling Techniques in Water Resources Systems, Canadian Ministry of the Environment, p 497-527, 1972. 13 equa, 56 ref.

Descriptors: Water resources development, *Mathematical models, *Operations research, Hydrologic aspects, *Social aspects, *Water quality, *Ecology, Stochastic processes, Parametric hydrology, Hydrographs, Forecasting, Optimization, Simulation analysis, Water storage, Irrigation water, Industrial water, Urban hydrology, Economics, Prices, Political aspects, Flood plains, Lakes, Estuaries, Thermal pollution.
Identifiers: *System components, *Socio-economic aspects, Hydrophysiography, Stochastic hydrological models, Hydropower.

Models of varying complexity, representing the multi-disciplinary aspect of water resources development and utilization, are presented and reviewed. Since rapid increase in world population and the rise in living standards generate an ever increasing demand for water, large systems are necessary for servicing large population concentrations. These large and often complex systems may become even more complicated as regional water resources approach the limit of the available supply. Moreover, such development has an impact upon the environment, affecting, to one degree or another, the various ecological systems within the region. Understanding of these complex systems necessitates the use of mathematical models that express the multi-disciplinary aspect of water resources development and maintenance. Components of water resources systems arise from the natural as well as the social domain. The numerous physical--biological and economical--institutional domains are discussed in the broad context of multi-disciplinary modelling (i.e., stochastic and parametric hydrological models, water storage, irrigation water, hydropower generation, industrial and urban domestic supplies, politically feasible alternatives, urban flood plain modelling, pricing for efficient water allocation, management strategy for water quality control, and modelling of ecological systems). Such modelling and analysis have been advanced due mainly to systems engineering, operations research, and analog, digital and hybrid computers. (See also W73-00090) (Bell-Cornell)
W73-00092

ECONOMIC MODELLING: ANALYSIS OF THE INTERRELATIONSHIPS BETWEEN WATER AND SOCIETY,
Colorado Univ., Boulder. Dept. of Economics.
C. W. Howe.
In: Proceedings (Vol. 3), International Symposium on Mathematical Modelling Techniques in Water Resources Systems, Canadian Ministry of the Environment, p 528-575, 1972. 4 fig, 7 tab, 60 ref.

Descriptors: Water resources, *Social aspects, *Social values, *Planning, Economics, *Model studies, Prices, Income, Market value, Competition, Cost sharing, Projections, Agriculture, Water demand, Crops, Water quality, Irrigation, Salinity, Industrial water, Surface-groundwater relationships.
Identifiers: *Multiple-objective planning, Regional planning, Groundwater management.

Contemporary issues in the social valuation of water resources are reviewed: (1) the appropriateness of market prices as they relate to income distribution, deviations from competitiveness in the economy, and the impact of very large projects; (2) the logic of adding expressed willingness-to-pay for water system outputs over sub-sets of society; and (3) the logic of procedures for extending market-like valuation processes to public goods. Different approaches to multiple-objective planning are then discussed. Significant advances in modelling are described for: large-scale projection models often used for regional planning; the agricultural sector with procedures for incorporating demand functions for the various crops; detailed programming of projects; water quality and groundwater management; and the management of salinity in irrigation. Finally, priorities for areas of further work are set forth: ex post analyses, long term effects upon demand of cost-sharing procedures, industrial water quality studies, the importance of water to industrial location, and conjunctive surface-groundwater management. (See also W73-00090) (Bell-Cornell)
W73-00093

THE SAINT JOHN STUDY: AN EXAMPLE OF COMPLEMENTARY USAGE OF OPTIMIZATION AND SIMULATION MODELLING IN WATER RESOURCES PLANNING,
Acres Consulting Services Ltd., Niagara Falls (Ontario). Applied Mechanics Dept.
O. T. Sigvaldason, R. J. deLucia, and A. K. Biswas.
In: Proceedings (Vol. 3), International Symposium on Mathematical Modelling Techniques in Water Resources Systems, Canadian Ministry of the Environment, p 576-602, 1972. 8 fig, 1 tab, 11 equa, 18 ref.

Descriptors: *Water resources development, *Alternative planning, *Canada, *Water quality control, *Optimization, *Simulation analysis, Water pollution treatment, Model studies, Systems analysis, Equations, Dissolved oxygen, Biochemical oxygen demand, Cost analysis, River basins, Flow, Pulp and paper industry, Pollution abatement.
Identifiers: *Saint John River basin.

Water resources development has become increasingly complex in Canada where the trend continues toward multiple-objective analysis for multiple-purpose plans. The Saint John River basin study was undertaken for purposes of research in and demonstration of advanced water resources planning methodology in Canada. The Saint John was selected because of its large size, its extensive degrees of development (for hydropower, recreation, salmon fisheries and to a lesser extent for water supply, flood control and navigation), the extensive amount of data already assembled through Atlantic Development Board investigations, and because of its severe water quality problems. The case study is based on the complementary usage of optimization and simulation models for water resources planning, with emphasis on water quality aspects. The optimization model employs linear programming and is used to derive required treatment levels to satisfy the desired levels of water quality for prescribed management policies. The simulation model then uses these treatment levels as a basis for evaluating detailed time-varying water quality responses throughout the basin as an aid for adjusting the required treatment plant capacities for meeting these standards. The Saint John Study and the

models are described and the complementary modelling is discussed. (See also W73-00090) (Bell-Cornell)
W73-00094

MATHEMATICAL MODELS FOR WATER QUALITY EVALUATION,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Moscow (USSR).
A. A. Aleksashenko, and M. G Khublaryan.
In: Proceedings (Vol. 3), International Symposium on Mathematical Modelling Techniques in Water Resources Systems, Canadian Ministry of the Environment, p 603-612, 1972. 30 equa, 8 ref.

Descriptors: *Water quality, *Evaluation, *Mathematical models, *Computers, Surface waters, Subsurface waters, Porous media, Water flow, Filtration, Convection, Dissolved oxygen, Saturation, Stratified flow, Water pollution sources, Water pollution treatment.
Identifiers: Dissolved matter, Convective diffusion.

Some mathematical models for water quality evaluation are presented. The models permit the determination of concentrations both in open and subsurface water bodies, and in a porous medium. A one-dimensional, boundary problem of unsteady transportation of dissolved matter in a porous medium under saturation conditions (the movement of dissolvent being unsteady) has been solved using a computer. Suggested are some analytical solutions for the one-dimensional case, the filtration rate varying along time or space coordinate. A single approach to the solution of a multi-dimensional problem in stratified media is illustrated by solving a two-dimensional problem of convective diffusion in the two-layer medium. The solution based on the method of Laplace integral transformations along time coordinate and finite transformation x along has been found for the above problem. The model accounting for the finite rate of diffusion is proposed. (See also W73-00090) (Bell-Cornell)
W73-00095

THE TRENT RIVER MODEL - AN AID TO MANAGEMENT,
Water Resources Board, Reading (England). Research Div.
D. H. Newsome.
In: Proceedings (Vol. 3), International Symposium on Mathematical Modelling Techniques in Water Resources Systems Canadian Ministry of the Environment, p 613-632, 1972. 8 fig, 2 tab, 4 ref.

Descriptors: *River regulation, *Water quality control, *Water demand, *Water supply, *Water allocation (Policy), *River basins, *Dynamic programming, Optimization, Water pollution treatment, Costs, Aquifers, Recreation demand.
Identifiers: *Trent River basin, United Kingdom, Birmingham, Nottingham, Bunter Sandstone, Quality states.

The increasing demand for water for industrial, agricultural and potable uses within the Trent River basin, the limited resources of the clean tributaries, the few available reservoir sites and the pollution load of the river have been causes of concern to the River Authority. To determine optimum use of the entire basin, the 3-year Trent Research Programme has been undertaken. The program has developed a mathematical model which operates at three levels: river model level; allocation level; and optimization of capital investment level. The model uses dynamic programming and is based upon quality states, an original idea enabling the river model to deal with up to 16 quality parameters simultaneously. The river model is presented and discussed in detail. It deals with the river itself in terms of quantity and quality and of costs and benefits associated with these parameters. Alternative methods of meeting water demands are considered, including use of the polluted river itself. Many other facets are dealt with, including recreation and the possible importation of water into the basin. Fundamentally, the basic conflict must be resolved between those using the river as an effluent carrier and those wishing to use it as a major water supply source. (See also W73-00090) (Bell-Cornell)
W73-00096

APPLICATION OF MATHEMATICAL MODELLING TECHNIQUE TO REGULATION OF SUBTERRANEAN WATER RESERVES IN WATER ECONOMY SYSTEMS,
Belorusskii Nauchno-Issledovatelskii Institut Melioratsii i Vodnogo Khozyaistva, Minsk (USSR).
V. S. Usenko, A. K. Altschul, P. I. Yakovenko, V. I. Zhuchenko, and M. O. Chaban.
In: Proceedings (Vol. 3), International Symposium on Mathematical Modelling Techniques in Water Resources Systems, Canadian Ministry of the Environment, p 633-642, 1972. 1 tab.

Descriptors: *Subsurface waters, *Artificial recharge, *Mathematical models, Surface runoff, Infiltration, Systems analysis, Hydrology.
Identifiers: *Water reserves, Water economy, Water-holding rocks.

The drain that industrialization and urbanization places upon water supplies necessitates not only regulation and preservation of water reserves, but also the artificial replenishment of these reserves, especially in the case of subsurface waters. The role of subterrainean waters in water economy systems is discussed. Current methods of estimating subterranean water reserves and of calculating their regulation, exploitation and distribution are explained. It is maintained that in the majority of cases it is optimal and most suitable to use the intermediate-type electric analog model (where some characteristics are in a continuous variation and others change discretely). For solving the problem of modelling the process of artificial replenishment of subterranean water reserves, an electro integrator has been used successfully. Modelling results show that the cost of a cubic meter of water at water intakes with artificially replenished reserves of subterranean water will be half to four-tenths as low as the cost of the same amount of water at water intakes with unregulated water reserves. (See also W73-00090) (Bell-Cornell)
W73-00097

COMBINING OPTIMIZATION WITH SURFACE-WATER FLOW,
ENWATS, Cambridge, Mass.
R. T. McLaughlin.
In: Proceedings (Vol. 3), International Symposium on Mathematical Modelling Techniques in Water Resources Systems, Canadian Ministry of the Environment, p 643-653, 1972. 4 fig, 5 equa, 10 ref.

Descriptors: *Optimization, *Surface waters, *Flow, *Hydraulics, *Channels, *Reservoirs, *Networks, *Steady flow, *Unsteady flow, Equations, Model studies, Systems analysis.
Identifiers: *Physical constraints, *Vertical alignment, *Horizontal alignment, *Series, *Trees, Literature review.

In many large and complicated subsystems of larger multi-purpose water resource systems, the surface water flow under the force of gravity is a significant phenomenon. Such subsystems include aqueducts, irrigation distribution, waste water collection, storm drainage, flood control and navigation. In the analysis for optimal design or operation of such subsystems, many of the governing constraints involve the principles and equations of hydraulics. In some cases, the region of feasible solutions can be determined only by the complete solution of a set of hydraulic equations, and the solution and optimization must proceed simultaneously. Because of these complications, both the progress in these problems in available literature and the amount of literature itself have been rather limited. The literature on work to date the current state, and some current work in progress are described. The review touches upon both steady and unsteady flow in systems of channels and reservoirs in series, trees and networks. Both vertical and horizontal alignment are considered. (See also W73-00090) (Bell-Cornell)
W73-00098

MATHEMATICAL MODELS FOR WATER MANAGEMENT IN ONTARIO, STATUS OF THE ART, 1971,
M. D. Palmer, and J. G. Ralston.
In: Proceedings (Vol. 3), International Symposium on Mathematical Modelling Techniques in Water Resources Systems, Canadian Ministry of the Environment, p 654-673, 1972. 9 fig, 17 ref.

Descriptors: *Great Lakes, *Canada, *Water quality control, *Mathematical models, *Rivers, *Dissolved oxygen, Lake Ontario, Lake Erie, Biochemical oxygen demand, Computers, Streambeds, Streamflow, Simulation analysis.
Identifiers: *Ontario, Streeter-Phelps model, Surface gradients, Benthic oxygen demand, Chemical data.

A detailed discussion of the state-of-the-art in mathematical models for water quality management in Ontario is presented. The survey consists of two sections. Section I deals with lakeshores. The growth in water use along the shore of the Great Lakes has indicated the need for water quality cause and effect relationships as new water intakes and waste discharges must be located to minimize the interaction with existing users. The variability of near shore processes complicates the evolution of cause–effect relationships. Presently the most complete approach appears to be the operation of spatially separated recording current and water chemistry meter pairs combined with other conventional type surveys. Section II outlines the experience of Ontario in the use of dissolved oxygen models for rivers. The types of models employed are discussed and the need for exhaustive field survey efforts to obtain reliable modelling input data is illustrated. Some ideas on the future of water quality modelling in Ontario are presented. (See also W73-00090) (Bell-Cornell)
W73-00099

ENVIRONMENT CANADA,
Department of the Environment, Ottawa (Ontario). Policy Planning and Research Service.
A. T. Davidson.
In: Proceedings (Vol. 3), International Symposium on Mathematical Modelling Techniques in Water Resources Systems, Canadian Ministry of the Environment, p 674-680, 1972.

Descriptors: *Canada, *Environment, *Ecosystems, *Long-term planning, *Natural resources, Great Lakes, Water pollution, Shores, Pipelines, Oil spills, Fishing, Rivers, Arctic, Cities, Wildlife, Climate, Governments, Decision making, Mathematical models, Systems analysis.

Canada's environmental characteristics and specific problems are discussed. Possessing the world's longest coastline and an enormous continental shelf, Canada feels responsibility toward other shipping nations; current concern lies with the problems of marine oil spills and preservation of fish species and stocks. Over- and under-fishing practices must be dealt with. Pollution in the Great Lakes is of vital concern to Canada, as well as the United States; the two nations continue working jointly on the problem. Increased activities, traffic, and population pose a direct threat to woildlife. Garbage and sewage solids disposal is a complex operation in the Arctic, and urban planning to

facilitate residential servicing in these extreme climates requires special ingenuity. New and more efficient analytical tools are being sought to assist Canada in her longterm, global planning decision-making. (See also W73-00090) (Bell-Cornell)
W73-00100

OPTIMIZING FLOOD CONTROL ALLOCATION FOR A MULTIPURPOSE RESERVOIR,
Montgomery (James M.) Consulting Engineers, Inc., Pasadena, Calif.
For primary bibliographic entry see Field 04A.
W73-00636

AN APPROACH TO EVALUATING ENVIRONMENTAL, SOCIAL, AND ECONOMIC FACTORS IN WATER RESOURCES PLANNING,
Utah Water Research Lab., Logan.
For primary bibliographic entry see Field 06B.
W73-00637

APPLICATION OF CRITICAL PATH METHOD TO WATER RESOURCES PLANNING,
Department of the Environment (Alberta). Water Resources Div.
T. V. Mussivand.
Water Resources Bulletin, American Water Resources Association, Vol 8, No 4, p 685-696, August, 1972. 6 fig.

Descriptors: *Water resources development, *Planning, *Critical path method, *Canada, River basins, Project planning, Alternative planning, Operations research.
Identifiers: *Alberta Water Resources Division, *Sturgeon River basin, *Network diagrams, Computations.

The effectiveness of the Critical Path Method in water resources planning is illustrated using actual projects as examples, and the preparation of network diagrams is outlined in detail. Planning is defined and its necessity discussed. Comprehensive planning is required to reconcile the conflicting demands upon water resources, to minimize adverse usage effects, increase benefits and eliminate unnecessary waste. Planning is the dynamic and continuous determination and implementation of courses of action in order to achieve a defined goal. Such planning involves five general phases: (1) problem identification; (2) formulating of alternatives; (3) evaluation of alternatives; (4) implementation; (5) review. There have been many attempts to simplify the planning process and effectively carry out these phases. The experience of the Alberta Water Resources Division has been that the Critical Path Method is one of the most useful tools available for planning. The Method involves two basic steps: (1) preparation of a network diagram which (a) identifies all the activities necessary for completion of a project, (b) correctly sequences these activities, and (c) allocates resources; and (2) mathematical computations for scheduling the activities. This approach breaks a task down into smaller units or activities for easier organization, scheduling, and performance for eventual completion of the project. (Bell-Cornell)
W73-00638

6B. Evaluation Process

SOME PROBLEMS OF WATER RESOURCE MANAGEMENT IN VIRGINIA: A PRELIMINARY EXAMINATION,
College of William and Mary, Williamsburg, Va.
J. A. Miri.
Available from the National Technical Information Service as PB-206 667, $3.00 in paper copy, $0.95 in microfiche. September 1971. 70 p, 2 tab, 105 ref, append.

Descriptors: *Water resources development, *Virginia, *Water management (Applied), Riparian rights, Legislation, Water resources, Regulation, Coordination, State governments, State jurisdiction, Water law, Administrative agencies, Adoption of practices, Decision making, Comprehensive planning, Water supply development, Administrative decision making, Water utilization, Water policy, Local governments, Governmental interrelations.

The pressure on limited water resources and the conflicts resulting from development and use of water resources stem from three sources: (1) the widespread effects of water withdrawals and the complex interrelationships among different water uses; (2) the fiscal limitations of local governmental water agencies; and (3) the limited geographic jurisdiction of local government. Some of the weaknesses of present riparian and statutory laws dealing with the management of water resources are discussed. Regulatory controls are often insufficient to insure that supplies will be developed and made available when and where needed. The problem is aggravated by a lack of coordination and inter-local rivalries. The result is inefficient and fragmented water supply systems. The state should seriously consider a more assertive role in water supply development, it should consider the purchase of sites suitable for water resource development before they are actually needed. The seriousness of these problems indicates a need for comprehensive study of water resources management in Virginia before any sweeping legislative or administrative changes. (Widman-Florida)
W73-00045

PLANNING FOR UNCERTAINTY: ENERGY IN THE YEARS 1975-2000,
Battelle Memorial Inst., Columbus, Ohio
For primary bibliographic entry see Field 03E.
W73-00080

MULTI-DISCIPLINARY MODELLING OF WATER RESOURCES SYSTEMS,
Technion - Israel Inst. of Tech., Haifa. Lowdermilk Faculty of Agricultural Engineering.
For primary bibliographic entry see Field 06A.
W73-00092

ECONOMIC MODELLING: ANALYSIS OF THE INTERRELATIONSHIPS BETWEEN WATER AND SOCIETY,
Colorado Univ., Boulder. Dept. of Economics.
For primary bibliographic entry see Field 06A.
W73-00093

THE TRENT RIVER MODEL - AN AID TO MANAGEMENT,
Water Resources Board, Reading (England). Research Div.
For primary bibliographic entry see Field 06A.
W73-00096

SOCIAL AND POLITICAL FEASIBILITY OF AUTOMATED URBAN WATER SYSTEMS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00149

WATER BALANCE AND WATER REGIME OF AN AREA AND THEIR PURPOSEFUL ALTERATION (VODNYY BALANS I VODNYY REZHIM TERRITORII I IKH TSELENAPRAVLENNOYE PREOBRAZOVANIYE),
Akademiya Nauk SSSR, Moscow. Institut Geografii.
M. I. L'vovich, and A. A. Sokolov.
Akademiya Nauk SSSR Izvestiya, Seriya Geograficheskaya, No 5, p 41-54, September-October 1971. 5 fig.

Descriptors: *Hydrology, *Water balance, *Water resources, *Water resources development, *Water control, Water policy, Water allocation (Policy), Administration, Organizations, Administrative agencies, Institutions, Coordination, Planning, Estimating, Forecasting, Land reclamation, Irrigation, Drainage, Regulation, Streamflow.
Identifiers: *USSR.

The problem of purposeful alteration of the water regime and water balance of an area is ultimately reduced to one of water control. In this situation, any passive approach to investigating the consequences of developments already constructed must be replaced by substantive action. To achieve a well-coordinated water policy, the problem must be attacked through cooperative action by scientific and planning institutes of the Main Administration of the USSR Hydrometeorological Service, the USSR Academy of Sciences, and the Ministries of Geology, Higher and Secondary Specialized Education, Water Resources, Agriculture, and Power and Electrification. Emphasis is on the need to develop techniques for careful assessment of all results of water-resources allocation and management. (Josefson-USGS)
W73-00193

PROGRAM PROSPECTUS FOR THE COASTAL RESOURCES MANAGEMENT COUNCIL.
Rhode Island Statewide Planning Program, Providence.

Available from the National Technical Information Service as PB-204 330. $3.00 in paper copy, $0.95 in microfiche. September 1971. 63 p, 6 fig, 4 ref.

Descriptors: *Coasts, *Land management, *Rhode Island, *Water resources management, *Planning, Land use, Project planning, Conservation, Preservation, Land resources, Recreation facilities, Resource conservation.
Identifiers: Coastal resource management.

Recognizing the responsibility of the State to protect, conserve and manage the State's coastal resources, the State of Rhode Island set up a statewide planning program. Because of the complexity of the problem and the cooperation needed from all levels of government, the planning program set up four major goals and 14 sub-classifications to these goals. Items included are: (1) identification of the coastal resources; (2) determination of potential resource uses; (3) determination of problems of coastal resources management, including conflicts of interest; (4) the formulation of plans and programs for the management of coastal resources; and (5) the formulation of standards and the re-evaluation of standards for land use, water pollution, air pollution and conservation areas. A detailed administrative program is presented, placing the responsibility of coastal management in the State's Department of Natural Resources. The total cost of the program is placed at $357,000 annually with $125,000 for debt service and $145,000 for personnel. Personnel required include a program chief, planners, civil engineers, an administrative assistant, clerical help and manual laborers. Funding for 1972 was planned without the use or need for federal funds. (Poertner)
W73-00450

AN APPROACH TO EVALUATING ENVIRONMENTAL, SOCIAL, AND ECONOMIC FACTORS IN WATER RESOURCES PLANNING,
Utah Water Research Lab., Logan.
A. B. Bishop.
Water Resources Bulletin, American Water Resources Association, Vol 8, No 4, p 724-734, August, 1972. 3 fig, 1 tab, 5 ref.

Descriptors: *Water resources development, *Alternative planning, *Decision making, *Projects,

*Social aspects, *Environmental effects, *Economics, *Evaluation, Flood control, Engineering, Water users, Costs, Benefits, Operations research.
Identifiers: *Project evaluation, *Economic analysis, *Factor analysis method, Interest groups, Public wants, Public goods.

Comprehensive planning for river basins or specific water resource problems must be achieved by planners interacting with the public through the planning process. Water resources planning is a process of refining and choosing among alternative approaches for satisfying public wants and evaluating them on the basis of their social, environmental, and community feasibility as well as for engineering and economics. Present methods of project evaluation are discussed, and an approach adapted from highway planning literature for evaluating both monetary and non-monetary variables and presenting them to decision makers at all levels is described. Social and environmental consequences are analyzed and presented using a graphical description called a 'factor profile,' which measures in appropriate units all relevant non-monetary effects of each alternative. Then, using the factor profile and engineering-economic analysis, a series of paired comparisions is made to obtain a preference ranking among alternatives. Since preference decisions are extremely complex, a step by step procedure to simplify the decision-making process is described. A case example considering four proposed flood control alternatives with the relevant environmental and social impacts is given to illustrate the use of the factor profile and the decision making procedure. (Bell-Cornell)
W73-00637

APPLICATION OF CRITICAL PATH METHOD TO WATER RESOURCES PLANNING,
Department of the Environment (Alberta). Water Resources Div.
For primary bibliographic entry see Field 06A.
W73-00638

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

ELECTRIC POWER GENERATION WITH DRY--TYPE COOLING SYSTEMS,
Beck (R. W.) and Associates, Denver, Colo.
For primary bibliographic entry see Field 05D.
W73-00068

THE LOW COST POWER MYTH,
Detroit Edison Co., Mich.
For primary bibliographic entry see Field 03E.
W73-00085

THE MUTUAL DOMESTIC WATER AND SEWAGE WORKS PROJECTS.
New Mexico Environmental Improvement Agency, Santa Fe. Water Quality Section.

December 1971. 34 p, 30 fig, 6 tab.

Descriptors: *Data collections, *Sewage works, *Waterworks, *New Mexico, Water supply, Sewage treatment, Finance, Government finance, Municipal wastes, Waste water treatment, Water treatment plants, Sewage treatment plants, Project summaries.
Identifiers: *State financing, Small communities.

The State of New Mexico, in an effort to control water pollution in small unincorporated communities, passed the Sanitary Projects Act to assist in the funding of water systems and sewage systems. Since the enactment of the law in 1947, the State has helped build 156 water systems and 11 sewerage systems. In order to obtain funds, the community must be at least 25 years old and be of sufficient size to offer service for at least 10 dwelling units. For communities under 28 units, maximum funding is $7,000; over 28 units, it is $250 per unit; and ranges up to a maximum of $12,000. The community is expected to contribute at least one-third of the amount funded by the State, in the form of money, materials and labor. This publication contains descriptions of all completed and current projects funded under the Sanitary Projects Act. Total cost of all projects since 1947 has been $1.7 million, an average of $75,000 annually for the 25 years the program has been in existence. (Poertner)
W73-00451

PROFITS, JOINT COSTS AND WATER QUALITY CONTROL,
University of Southern Mississippi, Hattiesburg.
For primary bibliographic entry see Field 05G.
W73-00639

ON THE CENTRALIZATION OF WASTE-WATER TREATMENT FACILITIES,
Northwestern Univ., Evanston, Ill. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00640

6D. Water Demand

PLANNING FOR UNCERTAINTY: ENERGY IN THE YEARS 1975-2000,
Battelle Memorial Inst., Columbus, Ohio
For primary bibliographic entry see Field 03E.
W73-00080

THE PROMISE OF UNCONVENTIONAL ENERGY SOURCES,
Battelle Memorial Inst. Columbus, Ohio.
For primary bibliographic entry see Field 03E.
W73-00088

COOLING WATER REQUIREMENTS FOR THE GROWING THERMAL GENERATION ADDITIONS OF THE ELECTRIC UTILITY INDUSTRY,
Westinghouse Electric Corp., East Pittsburgh, Pa. Power Systems Planning.
For primary bibliographic entry see Field 05G.
W73-00227

METROPOLITAN INDUSTRIAL WATER USE,
American Society of Civil Engineers, New York.
For primary bibliographic entry see Field 03D.
W73-00260

AREAWIDE WATER/SEWER ELEMENT AND PROGRAM.
Boyle Engineering, Bakersfield, Calif.
For primary bibliographic entry see Field 05D.
W73-00448

REGIONAL WATER AND WASTEWATER MANAGEMENT: TECHNICAL REPORT.
Ayres, Lewis, Norris and May, Inc., Ann Arbor, Mich.

Tri-County Regional Planning Commission, Lansing, Michigan, February 1971. 230 p, 35 fig, 39 tab.

Descriptors: *Water policy, *Comprehensive planning, Water supply development, Waste water disposal, Sewerage, Regional analysis, Municipal water, Administration, Long term planning, Census, Project planning, Water demand, Michigan.
Identifiers: *Lansing (Michigan).

The study area for this water and wastewater management study consists of 75 cities, villages and townships in the counties of Clinton, Eaton and Ingham. The report contains a policy plan, development plan, and improvement program for water and wastewater systems in the Tri-County region. The contents of this report are supplemented by detailed data presented in an appendices document published under separate cover. Historical population and land development trends are traced and future population growth and developed land patterns forecasted. The policy plan, prepared as a guide for decision-making, contains six goals and nineteen policies. Water and wastewater plans have been prepared for each local governmental unit in the region requiring a municipal system and for the Lansing metropolitan area as an entity. Two alternative regional approaches were evaluated for the Lansing metropolitan area in designing the water system. Thirteen alternatives were considered in determining recommendations for removal of wastewater in the metropolitan area. Capital, operation, and maintenance costs were estimated for each alternative to assist in selecting economically feasible alternatives. Programs scheduling system improvements for the immediate, short range (1980), and long range (1990) future are also presented. (See also W73-00455) (Poertner)
W73-00454

REGIONAL WATER AND WASTEWATER MANAGEMENT: APPENDICES.
Ayres, Lewis, Norris and May, Inc., Ann Arbor, Mich.

Tri-County Regional Planning Commission, Lansing, Michigan, February 1971. 159 p, 225 fig, 6 tab.

Descriptors: *Water policy, *Comprehensive planning, Water supply development, Waste water disposal, Sewerage, Regional analysis, Municipal water, Administration, Long term planning, Census, Project planning, Water demand, Michigan.
Identifiers: *Lansing (Michigan).

The study area for this water and wastewater management study consists of 75 cities, villages and townships in the counties of Clinton, Eaton and Ingham. Results of the regional water and wastewater management study have been recorded in three documents: (1) water and wastewater technical report, (2) set of appendices companion to the technical report, and (3) summary report highlighting various aspects of the regional water and wastewater technical report. This volume contains detailed information regarding: water and wastewater systems in each community in the Tri-County region; procedures followed in determining 1980 and 1990 urbanized areas; a listing of the different soils to be found in the Tri-County region; selected information about the mobile home parks located in the region including the means of wastewater removal afforded; historical and future population and land use figures for each governmental unit in the region; detailed cost estimates for various wastewater treatment alternatives discussed and evaluated in the technical report; water quality standards established by the Michigan Water Resources Commission; graphs portraying detailed information regarding the various rivers located in the region; and a glossary of definitions and terms. The appendices document has manifold uses. It can be used as a reference document when detailed information is sought regarding a particular point discussed in the regional water and wastewater management technical report. Another use might be as a source document. (See also W73-00454) (Poertner)
W73-00455

COMPREHENSIVE WATER RESOURCES STUDY OF THE GREENBREIR RIVER SUB--BASIN, VOLUME I--INVENTORY, 1968,
West Virginia Dept. of Natural Resources, Charleston. Div. of Water Resources.

J. R. DePaulo, Jr., and M. S. Baloch.
1969. 137 P, 22 FIG, 22 TAB, 104 REF.

Descriptors: *Surveys (Data collection), *Water supply, *Water resources, *West Virginia, Land use, Water resources management, Water resources development, Water quality, Watersheds (Basins), Watershed management, Surface waters.
Identifiers: Greenbrier River sub-basin.

Recognizing that future water demands will markedly increase due to population and industrial growth, it is the responsibility of the State's Department of Natural Resources Division of Water Resources to inventory present water resources. The State of West Virginia has been divided into watershed drainage areas. This report is the 1968 inventory of the Greenbrier River sub-basin, located in southeastern West Virginia. Topics included in this survey are : (1) basin description; (2) economic conditions in the area; (3) climate, geology and mineral resources; (4) agriculture; (5) recreation; (6) reservoirs, both existing and planned; (7) groundwater; and (8) surface water. Surface water is extensively inventoried and is broken into eleven subtopics of water supply, water quality, waste discharges, mine drainage and erosion and sedimentation. (See also W73-00457) (Poertner)
W73-00456

STREAM FLOW CHARACTERISTICS OF: GREENBRIER RIVER SUB-BASIN,
West Virginia Dept. of Natural Resources, Charleston. Div. of Water Resources.
M. S. Baloch, E. N. Henry, and W. H. Dickerson.
1969. 95 P, 42 FIG, 23 TAB.

Descriptors: *Streamflow records, *Data collections, *Watersheds (Basins), *Drainage basins, *Streamflow, West Virginia, Stream gages, Water supply, Hydrographs, Flow rates, Flow measurement, Flow duration curves, Flow characteristics.
Identifiers: *Greenbrier River sub-basin.

Recognizing that stream flow data must be available before realistic water quality and water demand considerations may be studied, the State of West Virginia, in cooperation with the U. S. Geological Survey, annually publishes streamflow data for selected West Virginia river basins. In order to enhance the usefulness of the data this report summarizes, for the available period of record, flow characteristics for the Greenbrier River Basin including extremes of high and low flows, flow durations and estimates for the frequency or return period for given flows. Streamflow data in summary form for five gaging stations are presented. The information may be used by agencies or individuals for planning, development and management for the better use of surface water supplies. For example, high-flow frequency may determine the quantity of water to be stored in order to reduce flow damages downstream. Low-flow information may be used to determine storage requirements for industrial, municipal and agricultural water supplies or establish requirements for low-flow augmentation. (See also W73-00456) (Poertner)
W73-00457

CENTRAL UPPER PENINSULA WATER AND WASTE WATER PLAN.
Central Upper Peninsula Planning and Development District, Escanaba, Mich.
For primary bibliographic entry see Field 05D.
W73-00460

6E. Water Law and Institutions

DOCUMENTS FOR THE U.N. CONFERENCE ON THE HUMAN ENVIRONMENT, STOCKHOLM, JUNE 5-16, 1972--PART I.
Department of State, Washington, D. C.
For primary bibliographic entry see Field 06G.
W73-00042

SOME PROBLEMS OF WATER RESOURCE MANAGEMENT IN VIRGINIA: A PRELIMINARY EXAMINATION,
College of William and Mary, Williamsburg, Va.
For primary bibliographic entry see Field 06B.
W73-00045

AN ACT...TO MAINTAIN PREVENTIVE PROCEDURES CIRCUMVENTING DISPOSAL OF TRASH OR JUNK INTO STATE WATERS.

Maryland Laws ch 283 (1971).

Descriptors: *Maryland, *Water pollution control, *Legislation, *Water pollution sources, Abatement, State governments, Administrative agencies, Water law, Water quality control, Pollution abatement, Regulation, Governments, Retaining walls.

Owners and operators of junkyards and automobile graveyards which adjoin any body of water must maintain preventive procedures to prevent the disposal of trash and junk into state waters; must inform the Department of Water Resources of procedures planned or effected to prevent such dumping; and must comply with provisions relating to the erection of retaining walls. Where the owners and operators have not erected retaining walls, other restraining devices, or approved procedures, the presence of any trash, junk or other refuse in state waters, on embankments or other sites where it may fall or be transported into the water shall be prima facie evidence of a violation of the section. Violation of the section is a misdemeanor punishable by fine, imprisonment or both. (Ellis-Florida)
W73-00046

CAN THE U.S. WIN THE WAR AGAINST POLLUTION.
U.S. News and World Report, p 84-89, March 20, 1972. 6 photo.

Descriptors: *Water pollution control, *Pollution abatement, *Eutrophication, *Federal government, Public health, Water pollution sources, Legislation, Pesticides, Sanitary engineering, Detergents, Industrial wastes, Municipal wastes, Grants, Waste treatment, Lake Erie, Lake Huron, Great Lakes, Treatment facilities, Phosphates, Waste disposal.

The Administrator of the Environmental Protection Agency discusses major pollution problems and explains actions taken by the Agency. The Agency's stepped-up enforcement of water pollution control laws is noted; notices were served on 60 towns and cities during 1971 for violation of federal-state water quality standards. The Administration's major difficulty with the Senate-passed water pollution control legislation is accepting some of its goals and deadlines. A goal of no discharge for industrial pollutants by 1985 is unwise and borders on deception by promising a goal which cannot be reached. Discussing the accelerated eutrophication of Lake Erie, phosphates are cited as the key pollutant. Through enforcement conferences and direct enforcement action against cities and industries, the Agency has stepped up the cleanup of the Great Lakes. Additional federal funds have been made available to cities to build or expand waste treatment facilities and agreements reached have called for the installation of phosphate removal facilities. The effects of pesticides are also discussed. (Waldron-Florida)
W73-00047

GROUND-WATER BASIN MANAGEMENT ON THE HIGH PLAINS OF TEXAS,
High Plains Underground Water Conservation District No. 1, Lubbock, Tex.
For primary bibliographic entry see Field 04B.
W73-00130

WATER QUALITY STANDARDS SUMMARY FOR INTERSTATE WATERS IN THE COMMONWEALTH OF PENNSYLVANIA.
Environmental Protection Agency, Philadelphia, Pa. Region III; and Pennsylvania Dept. of Environmental Resources, Harrisburg.
For primary bibliographic entry see Field 05G.
W73-00134

A COMPARATIVE STUDY OF STATE WATER POLLUTION CONTROL LAWS AND PROGRAMS,
North Carolina Water Resources Research Inst., Raleigh.
For primary bibliographic entry see Field 05G.
W73-00142

A STUDY OF LEGAL AND ADMINISTRATIVE PRACTICES RELATING TO LAKE POLLUTION IN THE NORTHEAST,
Connecticut Univ., Storrs. Inst. of Water Resources.
W. C. Kennard, R. I. Reis, and P. Goldstein.
Completion Report, 1972. 3 p. OWRR A-028-CONN (2).

Descriptors: *Judicial decisions, *Lakes, *Water pollution, *Thermal pollution, *Decision making, *Water policy, Legislation, Nuclear powerplants, Environmental effects.
Identifiers: *Calvert Cliffs Decision, *Environmental activism, *Citizen groups, U. S. Court of Appeals, Atomic Energy Commission, Environmental Protection Agency, Federal agencies.

A study has been made of judicial decisions and legislatie developments applicable to lake water quality in the U. S., and a basic inventory of legal techniques has been compiled. The overall framework for general organic or chemical lake pollution control exists in state legislative or executive responsibilities, especially in New England. In the matter of thermal pollution by nuclear-power generating plants, a decision by a U. S. Court of Appeals (Calvert Cliffs 1971) appeared to state clearly the roles of the Atomic Energy Commission and the Environmental Protection Agency in preventing environmental damage by nuclear power plants. Close examination showed that many important questions are left unanswered by the Calvert Cliffs decision. The significant role of environmental action groups, and responsiveness to such groups may be of substantial importance to state and federal agencies. (See also W72-13296)
W73-00271

DOCUMENTS FOR THE U.N. CONFERENCE ON HUMAN ENVIRONMENT, STOCKHOLM, JUNE 5-16, 1972--PART II.
Department of State, Washington, D.C.

Available from the National Technical Information Service as PB-206 618-2. March 1972. 400 p, 2 tab.

Descriptors: *United Nations, *Environmental control, *Programs, *International law, Adoption of practices, Administrative agencies, Administrative decisions, Comprehensive planning, Pollutant identification, Pollution abatement, Alternate planning, Coordination, Social aspects, Planning, Environmental effects, Political aspects, Institutions, Resources development.

Planning and management of human settlements for environmental quality are discussed, including such areas as the need for action, the key aspects of the settlements problem, the means for action, and recommendations for action. Environmental aspects of natural resources management are also

discussed, including an approach to integrated resource management, sectoral recommendations, and a summary of recommendations for international action. The identification and control of pollutants of broad international significance includes discussions of the biosphere as context, the nature and extent of pollution problems, characteristics of some major pollutants, major pollution problems, considerations for national action, international cooperation for pollution control, specific areas of needed action, a comprehensive approach to the problem of marine pollution, and recommendations for action. Educational, information, social, and cultural aspects of environmental problems include the need, objectives, means, and recommendations for action. A discussion of the environmental problems in developing countries is included. International organizational implications of action proposals, include discussions on approaches, functions, institutional alternatives, and funding. The annex discusses organization to deal with marine pollution. (Widman-Florida)
W73-00466

INTERBASIN TRANSFERS: NEBRASKA LAW AND LEGEND,
Florida State Univ., Tallahassee. School of Law.
For primary bibliographic entry see Field 04A.
W73-00475

WETLANDS.
Central Atlantic Environment Service, Washington, D.C.
For primary bibliographic entry see Field 06G.
W73-00479

SHATTLES V. FIELD, BRACKETT AND PITTS, INC. (INCREASE IN DRAINAGE FROM UPPER TO LOWER LANDOWNER).

261 So.2d 795-798 (Miss. 1972). 4 p.

Descriptors: *Mississippi, *Judicial decision, *Trespass, *Alteration of flow, Drainage, Drainage systems, Surface drainage, Drainage water, Surface waters, Controlled drainage, Flow control, Flow augmentation, Runoff, Water law, Legal aspects, Water distribution (Applied), Water management (Applied), Riparian rights, Eminent domain, Easements, Adjacent landowners, Land tenure, Drainage practices.
Identifiers: *Injunctions (Mandatory), Intentional torts.

Plaintiff, lower landowner, sought an injunction requiring defendant, upper landowner, to fill in a drainage ditch on plaintiff's land, to restore the land to its former condition and to take care of excess surface water. Defendant constructed the ditch on plaintiff's land without permission. As a result the drainage onto plaintiff's land had been changed from diffused surface waters to a more concentrated flow and increased volume. Defendant contended that plaintiff was not entitled to an injunction since he had an adequate remedy at law. The Mississippi Supreme Court held an upper landowner may increase the flow of surface water in the reasonable exercise of his right of drainage in developing his property even if it results in drainage exceeding the capacity of the natural watercourse, provided however that he may not collect his surface water into an artificial watercourse and then discharge it onto the lower land in greater quantity and concentration than would occur naturally. The court also held that the acts of defendant constituted a willful trespass against plaintiff's land and that plaintiff was entitled to an injunction. (Brackins-Florida)
W73-00485

ARMSTRONG V. RED RIVER, ATCHAFALAYA AND BAYOU BOUEF LEVEE BOARD, (RIGHT OF CONTINOUS EASEMENT FOR DITCHES, CANALS, AND LEVEES).

261 So.2d 298-310 (La. Ct. App. 1972). 13 p.

Descriptors: *Louisiana, *Easements, *Canals, *Prescriptive rights, Ditches, Levees, Legal aspects, Water law, Civil law, Legislation, Drainage practices, Surface water, Surface drainage, Watercourses (Legal aspects), Drainage districts, Land tenure.

Plaintiff property owner sued to cancel defendant drainage board's servitude over plaintiff's land. Plaintiff granted defendant a servitude over a tract of land for construction of ditches, canals and levees. Plaintiff alleged that defendant had failed to use a substantial portion of the servitude. Defendant contended that the servitude was a continuous one requiring no act of man to be continual and thus a valid servitude. The Louisiana Third Circuit Court of Appeals held that the right to construct and maintain canals, ditches and levees and all rights accessory thereto constitutes a continuous servitude. The time for prescription for continuous servitudes begins only from the day any act contrary to the servitude has been committed. The court further held that the defendant was the owner of a continuous servitude which, because no acts contrary to it had been committed, had not been prescribed. The court ruled that under the civil law the 'acts of man' test controlled the determination of whether a servitude was continuous or not. (Brackins-Florida)
W73-00487

INTERPROVINCIAL RIVERS,
Department of Justice, Ottawa (Ontario).
G. V. La Forest.
Canadian Bar Review, Vol 50, No 1, p 39-49, 1972. 52 ref.

Descriptors: *Boundary disputes, *Canada, *Riparian rights, *Thalweg, Equitable appropriation, Foreign countries, Riparian waters, Jurisdiction, Water rights, Legal aspects, Boundaries (Property), Rivers, Federal jurisdiction, Water law, Legal review, Constitutional law, Judicial decisions, Common law, Legislation, Federal-state water rights conflicts.
Identifiers: *Interprovincial rivers, *Boundary rivers, *Transboundary rivers.

Many legal problems arise in connection with both boundary and transboundary interprovincial rivers. The major problem peculiar to boundary rivers of those forming a part of an interprovincial boundary is the location of the boundary. Both the thalweg, or middle of the channel, and the common law rule of the center line between banks have been proposed as possible solutions. The arguments and problems are discussed. The major problem in connection with transboundary rivers of those flowing across or into an interprovincial boundary involves injury by one party as a result of action by another in an adjacent province. Courts will most likely follow the common law doctrine of riparian rights and equitable apportionment to determine applicable law. Since courts will generally not entertain an action for damages to land located in another province, further problems are also involved in determining the appropriate court. The problems and the developed case law are discussed. Legislative attempts to solve the problem could be either through federal or provincial law, however, there are difficulties with each. Further federal jurisdiction, however, would probably not prevent provinces entering into agreements among themselves concerning common interprovincial rivers. (Crow-Florida)
W73-00490

THE DELAWARE COASTAL ZONE ACT,
W. H. Feigenbaum.
Buffalo Law Review, Vol 21, No 2, p 481-495, 1972. 87 ref.

Descriptors: *Delaware, *Legislation, *Coasts, *Zoning, Pulp and paper industry, Coastal marshes, Wetlands, Legal aspects, Regulation, Industries, Governments, Non-structural alternatives, Permits, State governments, Riparian rights, Judicial decisions, Law enforcement, Constitutional law, Public rights, Condemnation, Industrial plants, Industrial wastes, Chemical industry, Oil industry.
Identifiers: *Coastal waters.

The Delaware Coastal Zone Act is the most comprehensive legislation to date governing industrial development in a coastal area. The Act prohibits the further introduction into the coastal zone of 'heavy industry', including oil refineries, steel manufacturing plants and cellulosic paper mills. Before a manufacturing concern is permitted to enter the area it must meet certain guidelines. Other aspects of the Act are discussed and it is compared with other state wetlands statutes. The validity of zoning legislation has traditionally been attacked as being violative of the due process clause of the United States Constitution and such an assault will probably be made on the Act. An additional onslaught may be made using the commerce clause. The principal legal issue to be faced is the question of 'taking' of private property, without compensation in violation of due process, as opposed to the reasonable regulation of private property under the state's police power. The attitude of the Delaware Supreme Court on the taking issue will ultimately dictate the effectiveness of the Act. (Nielsen-Florida)
W73-00492

ENVIRONMENTAL PROBLEMS AND THE USE OF CRIMINAL SANCTIONS,
Southern Methodist Univ., Dallas Tex. School of Law.
For primary bibliographic entry see Field 05G.
W73-00493

QUI TAM ACTIONS AGAINST POLLUTERS OF NAVIGABLE WATERS: AN ATTEMPTED AUGMENTATION OF REFUSE ACT ENFORCEMENT,
For primary bibliographic entry see Field 05G.
W73-00494

ENVIRONMENTAL RIGHT OF ACTION--A SUGGESTED STATUTE AND COMMENTARY,
For primary bibliographic entry see Field 05G.
W73-00495

LAW OF THE SEA AND PEACEFUL USES OF THE SEABEDS.

Hearings--Subcomm. on Int'l. Organizations and Movements--Comm. on Foreign Affairs, House of Representatives, 92nd Congress, second session, April 10, 11, 1972. 115 p.

Descriptors: *United Nations, *Law of the sea, *International law, Federal government, Oil industry, Water law, Treaties, Foreign countries, Commercial fishing, Legal aspects, Oceans, Foreign waters, Exploration, International commissions, International waters.
Identifiers: *Coastal waters.

The focal point of the hearings was the United Nations Law of the Sea Conference, 1973, and preparations for the Conference. The hearings were held in order to define the national interest on the Law of the Seas through testimony from U.S. agencies, legal and marine scholars and experts on mining, petroleum and fishing. The objectives of our national ocean policy were determined to be: preservation of national security, development of food and energy resources, granting assistance to developing nations, protection of the marine environment, and establishment of an international regime to govern ocean activities

beyond the limits of national jurisdiction. Eventual agreement on the following elements is foreseen: a 12-mile territorial sea, with freedom of navigation beyond this limit, coastal state economic controls over ocean resources beyond 12 miles, an international regime for the seabed beyond the area of coastal state economic jurisdiction. Unsettled issues include: the extent and nature of coastal state jurisdiction, free transit through and over international straits, the nature of the international control beyond coastal state economic jurisdiction, the nature of the control of marine pollution beyond 12 miles. (Beardsley-Florida)
W73-00511

6F. Nonstructural Alternatives

PROGRAM PROSPECTUS FOR THE COASTAL RESOURCES MANAGEMENT COUNCIL.
Rhode Island Statewide Planning Program, Providence.
For primary bibliographic entry see Field 06B.
W73-00450

6G. Ecologic Impact of Water Development

LIBBY DAM AND LAKE KOOCANUSA, KOOTENAI RIVER, MONTANA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.
For primary bibliographic entry see Field 08A.
W73-00040

TELLICO PROJECT, FINAL ENVIRONMENTAL IMPACT STATEMENTS.
Tennessee Valley Authority, Chattanooga. Office of Health and Environmental Science.
For primary bibliographic entry see Field 08A.
W73-00041

DOCUMENTS FOR THE U.N. CONFERENCE ON THE HUMAN ENVIRONMENT, STOCKHOLM, JUNE 5-16, 1972--PART 1.
Department of State, Washington, D. C.

Available from the National Technical Information Service as PB-206 618-1, $3.00 in paper copy, $0.95 in microfiche. March 1972. 135 p.

Descriptors: *United Nations, *Water resources development, *Environmental control, *Conferences, *Publications, Governmental interrelations, Coordination, Comprehensive planning, Governments, International commissions, Water management (Applied), Management, Regulation, Water law, Publications, Legal aspects, Social aspects, Political aspects.
Identifiers: *United Nations Conference on the Human Environment.

The ultimate goal of the Conference on the Human Environment is to achieve a dynamic equilibrium between man and the natural environment which will allow the full development and expression of the highest potential of man. Proposed herein for Conference consideration are (1) a draft declaration on the human environment incorporating agreed principles of international behavior and responsibilities, and (2) an action plan comprised of a framework for international environmental action. The action plan, or human environmental program, constitutes international environmental cooperation in identifying areas of common concern and agreeing on measures to deal with them. The areas of concern are: (1) improvement of human settlements and health; (2) development and use of fresh water, land, and resources; (3) harmonizing development goals and social and cultural values with environmental objectives; and (4) protection of living resources and the ocean. The action plan consists of a global environmental assessment program, environmental management activities, and supporting measures for assessment and management activities. Implementation of the plan will be largely possible through the programs and activities of existing national and international organizations. (Ellis-Florida)
W73-00042

MAINTENANCE OF THE HARLEM RIVER CHANNEL, NEW YORK, NAVIGATION PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.
For primary bibliographic entry see Field 04A.
W73-00043

PROPOSED SEWAGE FACILITIES, RICHLAND, WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, Seattle, Wash. Region X.
For primary bibliographic entry see Field 05D.
W73-00044

MANITOWOC HARBOR, WISCONSIN (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Chicago, Ill.
For primary bibliographic entry see Field 04A.
W73-00048

PEARL RIVER COMPREHENSIVE BASIN STUDY (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Water Resources Council, Washington, D.C.
For primary bibliographic entry see Field 08A.
W73-00049

SKIATOOK LAKE, HOMINY CREEK, OKLAHOMA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 08D.
W73-00050

LANEPORT, NORTH FORK AND SOUTH FORK LAKES, SAN GABRIEL RIVER, TEXAS (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Fort Worth, Tex.
For primary bibliographic entry see Field 08D.
W73-00051

PROPOSED DEEP GEOTHERMAL TEST WELL, GEOTHERMAL RESOURCES INVESTIGATIONS, IMPERIAL VALLEY, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Boulder City, Nev. Region 3.
For primary bibliographic entry see Field 04B.
W73-00052

MANASQUAN RIVER, NEW JERSEY (DRAFT ENVIRONMENTAL STATEMENT).
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 04A.
W73-00053

MILITARY OCEAN TERMINAL, SUNNY POINT, NORTH CAROLINA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Wilmington, N.C.
For primary bibliographic entry see Field 04A.
W73-00054

TOWN OF COUSHATTA--FLOOD PREVENTION PROJECT MEASURE TWIN VALLEY RC AND D PROJECT, LOUISIANA (DRAFT ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 08A.
W73-00055

CONSTRUCTION OF WASTEWATER FACILITIES, AUSTIN, TEXAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, Dallas, Tex. Air and Water Programs.
For primary bibliographic entry see Field 05D.
W73-00056

MAINTENANCE OF THE NEW YORK AND NEW JERSEY CHANNELS, NAVIGATION PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.
For primary bibliographic entry see Field 04A.
W73-00057

LAWRENCE, KANSAS, FLOOD PROTECTION PROJECT, KANSAS RIVER, KANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 08D.
W73-00058

WAHKIAKUM COUNTY CONSOLIDATED DIKING DISTRICT NO. 1, FLOOD PROTECTION PROJECT, WAHKIAKUM COUNTY, WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Portland, Oreg.
For primary bibliographic entry see Field 08D.
W73-00059

BIG SIOUX RIVER AT AND IN THE VICINITY OF SIOUX CITY, IOWA AND NORTH SIOUX CITY, SOUTH DAKOTA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Omaha, Nebr.
For primary bibliographic entry see Field 04A.
W73-00060

SHOEMAKER RIVER WATERSHED, ROCKINGHAM COUNTY, VIRGINIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Richmond, Va.
For primary bibliographic entry see Field 04D.
W73-00061

NUCLEAR SAFETY: RESPONDING TO THE CRITICS.
For primary bibliographic entry see Field 05G.
W73-00084

ENVIRONMENT CANADA,
Department of the Environment, Ottawa (Ontario). Policy Planning and Research Service.
For primary bibliographic entry see Field 06A.
W73-00100

CHESAPEAKE BAY STUDY,
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 02L.
W73-00113

IMPACT OF DROUGHT ON NEW JERSEY'S WATER RESOURCES,
Geological Survey, Trenton, N.J.
P. W. Anderson, S. D. Faust, and J. E. McCall.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 98, No IR3, Paper 9205, p 375-385, September 1972. 8 fig, 6 ref.

Descriptors: *Droughts, *New Jersey, *Water shortage, *Environmental effects, Estuaries, Hydrogeology, Streamflow, Irrigation, Water treatment, Water quality, Water resources development, Water supply.

New Jersey, together with other northeastern states, in 1966 began to recover from its 5th consecutive year of severe drought. The environmental effects of this drought upon the state's surface water resources were manifold. Among them were deterioration of stream quality, severe decreases in streamflows, critical depletion of storage in reservoirs used for public-water supply, increased chemical-treatment costs for potable-water supplies, record high intrusion of salinity in estuaries, changing fish-migration patterns, and upstream movement of a major oyster predator onto seed beds. Residual effects of this drought on streamflow and water quality were evident for up to 2 yr after the meteorological drought had ended. (Knapp-USGS)
W73-00135

NEW APPROACH TO POWER PLANT SITING,
Commonwealth Association, Inc., Jackson, Mich. Environmental Systems Div.
For primary bibliographic entry see Field 05G.
W73-00223

ENVIRONMENTAL ASPECTS OF SITE SELECTION,
Harza Engineering Co., Chicago, Ill.
For primary bibliographic entry see Field 05G.
W73-00224

THE NETHERLANDS DELTAPROJECT: ITS ENVIRONMENTAL IMPACT,
Rijkswaterstaat-Deltadienst, The Hague (Netherlands).
For primary bibliographic entry see Field 02L.
W73-00325

ECOLOGICAL EFFECTS OF OIL POLLUTION,
Battelle-Northwest, Richland, Wash.
For primary bibliographic entry see Field 05C.
W73-00386

SNAGGING AND CLEARING PROJECT ON GALLINAS RIVER, LAS VEGAS, NEW MEXICO (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Albuquerque, N. Mex.
For primary bibliographic entry see Field 04D.
W73-00462

RUSSIAN RIVER BASIN (CHANNEL IMPROVEMENT AND BANK STABILIZATION) SONOMA AND MENDOCINO COUNTIES, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, San Francisco, Calif.
For primary bibliographic entry see Field 04D.
W73-00463

MAINTENANCE, DREDGING, NORWALK HARBOR, CONNECTICUT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 08A.
W73-00464

BOUND BROOK FLOOD CONTROL, SCITUATE, MASSACHUSETTS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.
For primary bibliographic entry see Field 04A.
W73-00465

DOCUMENTS FOR THE U.N. CONFERENCE ON HUMAN ENVIRONMENT, STOCKHOLM, JUNE 5-16, 1972--PART II.
Department of State, Washington, D.C.
For primary bibliographic entry see Field 06E.
W73-00466

EIGHTEEN MILE CREEK WATERSHED, SOUTH CAROLINA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 08A.
W73-00467

RIVER ROUGE FLOOD CONTROL PROJECT, WAYNE COUNTY, MICHIGAN (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Detroit, Mich.
For primary bibliographic entry see Field 08A.
W73-00468

NORTHEAST FLOOD STUDY, SUSQUEHANNA RIVER BASIN FLOOD CONTROL AND MINE SUBSIDENCE IN WYOMING VALLEY, PENNSYLVANIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.
For primary bibliographic entry see Field 08A.
W73-00469

LAKE WOHLFORD, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Federal Power Commission, Washington, D.C.
For primary bibliographic entry see Field 08A.
W73-00470

WESTERN UNIT FLOOD PROTECTION PROJECT, BILLINGS, MONTANA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Omaha, Nebr.
For primary bibliographic entry see Field 08A.
W73-00471

HURRICANE CREEK WATERSHED STRUCTURAL PROJECT, MEASURE, KENTUCKY (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 08A.
W73-00472

PALZO RESTORATION PROJECT, ILLINOIS (DRAFT ENVIRONMENTAL STATEMENT).
Forest Service (USDA), Milwaukee, Wis. Eastern Region.
For primary bibliographic entry see Field 05G.
W73-00473

REHABILITATION AND BETTERMENT PROGRAM, CASCADE IRRIGATION DISTRICT (DRAFT ENVIRONMENTAL STATEMENT).
Bureau of Reclamation, Boise, Idaho. Region 1.
For primary bibliographic entry see Field 08A.
W73-00474

PROPOSED HAVASU INTAKE CHANNEL, HAVASU PUMPING PLANT, AND BUCKSKIN MOUNTAINS TUNNEL (DRAFT ENVIRONMENTAL STATEMENT).
Bureau of Reclamation, Boulder City, Nev. Region 3.
For primary bibliographic entry see Field 08C.
W73-00476

PORT EVERGLADES HARBOR, BROWARD COUNTY, FLORIDA (DRAFT ENVIRONMENTAL STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 08A.
W73-00477

BREVARD COUNTY, BEACH EROSION CONTROL PROJECT (DRAFT ENVIRONMENTAL STATEMENT).
Army Engineer District, Jacksonville, Fla.
For primary bibliographic entry see Field 04D.
W73-00478

WETLANDS.
Central Atlantic Environment Service, Washington, D.C.

Central Atlantic Environment News, Vol 2, No 8, p 1-7, August 1972. 1 fig, 2 photo.

Descriptors: *Wetlands, *Maryland, *Virginia, *Marshes, Conservation, Dredging, Environmental engineering, Natural resources, Land development, Wildlife conservation, Administrative agencies, State governments, Legislation, Environmental effects, Land reclamation, Atlantic Coastal Plain, Marsh management, Legal aspects, Land use, Water law, Permits.
Identifiers: Licenses.

The assault on the marshlands of Virginia and Maryland, and the efforts to defend them are reviewed. Despite the two year old Maryland wetlands law and the new Virginia Wetlands Act, the marshlands are still in danger. Maryland's law sets forth development standards and a licensing procedure for two categories of wetlands: state and private. The law is currently in effect as to state wetlands and has sharply curbed the dredging, filling and unauthorized altering of state wetlands. The rules and procedure for private wetlands will be effective as of Spring 1973. The licensing procedure has not only allowed the state to make modifications reducing damage to wetlands but has discouraged many developers. Virginia's new law is narrower in scope than Maryland's. A 'grandfather' clause allows development plans filed before the date of the act to be exempt. The damage to wetlands from this clause is predicted to be substantial. Specific examples of past and future wetlands damage caused by developers are described. (Beardsley-Florida)
W73-00479

GULF INTRACOASTAL WATERWAY--MOUTH OF COLORADO RIVER, TEXAS (NAVIGATION, FLOOD CONTROL) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 08A.
W73-00481

GAS HOUSE COVE (EAST HARBOR FACILITY) SAN FRANCISCO MARINA SMALL BOAT HARBOR, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, San Francisco, Calif.
For primary bibliographic entry see Field 08A.
W73-00482

BROWNSVILLE, WASHINGTON SMALL BOAT BASIN (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.
For primary bibliographic entry see Field 08A.
W73-00483

MAINTENANCE OF NEWTOWN CREEK, NEW YORK, NAVIGATION PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.
For primary bibliographic entry see Field 08A.
W73-00484

MAINTENANCE OF GREAT SOUTH BAY AND PATCHOGUE RIVER, NEW YORK, NAVIGATION PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.
For primary bibliographic entry see Field 08A.
W73-00486

NEW HOPE LAKE, HAW RIVER, NORTH CAROLINA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Wilmington, N.C.
For primary bibliographic entry see Field 08D.
W73-00488

KAWAIHAE HARBOR FOR LIGHT DRAFT VESSELS, HAWAII COUNTY, (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Honolulu, Hawaii. Pacific Ocean Div.
For primary bibliographic entry see Field 08A.
W73-00489

REHABILITATION OF THE NOLICHUCKY PROJECT (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Tennessee Valley Authority, Chattanooga, Tenn. Office of Health and Environmental Science.
For primary bibliographic entry see Field 08A.
W73-00496

OCEAN OUTFALL EXTENSION PROJECT (WPC-CAL-468), CARMEL SANITARY DISTRICT, CARMEL, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, San Francisco, Calif.
For primary bibliographic entry see Field 05G.
W73-00497

WEST FORK DES MOINES RIVER, JACKSON, MINNESOTA, LOCAL PROTECTION PROJECT (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Rock Island, Ill.
For primary bibliographic entry see Field 04A.
W73-00498

TREASURE ISLAND, MISSOURI (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Memphis, Tenn.
For primary bibliographic entry see Field 08C.
W73-00500

MUD MOUNTAIN DAM AND RESERVOIR, WHITE RIVER, WASHINGTON (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Seattle, Wash.
For primary bibliographic entry see Field 08D.
W73-00502

SAMMAMISH RIVER, WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 08A.
W73-00503

NAVIGATION PROJECT, GREAT SOUTH BAY, AND PATCHOGUE RIVER, NEW YORK (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District. New York.
For primary bibliographic entry see Field 08A.
W73-00504

BAYOU CODEN, ALABAMA NAVIGATION (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Mobile, Ala.
For primary bibliographic entry see Field 08A.
W73-00505

BEACH EROSION PROJECT, DELAWARE COAST PROTECTION PROJECT, DELAWARE (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Philadelphia, Pa.
For primary bibliographic entry see Field 08A.
W73-00506

GULF INTRACOASTAL WATERWAY, OFFATTS BAYOU, TEXAS (NAVIGATION) (FINAL ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 08A.
W73-00507

EVERETT HARBOR, WASHINGTON--TRAINING DIKE AND BREAKWATER (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
For primary bibliographic entry see Field 08A.
W73-00508

FLOOD CONTROL ON SAGINAW RIVER, MICHIGAN AND TRIBUTARIES, FLINT RIVER AT FLINT, SWARTZ AND THREAD CREEKS (SECTIONS C-1 AND D) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Detroit, Mich.
For primary bibliographic entry see Field 08A.
W73-00509

ALPINE LAKE PROJECT, ALPINE, TEXAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Albuquerque, New Mex.
For primary bibliographic entry see Field 08D.
W73-00510

GULF INTRACOASTAL WATERWAY, CHOCOLATE BAYOU, TEXAS (NAVIGATION) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.
For primary bibliographic entry see Field 08A.
W73-00512

07. RESOURCES DATA

7B. Data Acquisition

PRECIPITATION MEASUREMENTS WITH VARIOUS PRECIPITATION GAUGE INSTALLATIONS,
Lantbrukhogskolan, Uppsala (Sweden). Institutionen for Lantbrukets Hydroteknik.
For primary bibliographic entry see Field 02B.
W73-00015

REMOTE SENSING OF THE CHESAPEAKE BAY.
For primary bibliographic entry see Field 05B.
W73-00101

TECHNICAL KEYNOTE ADDRESS ON REMOTE SENSING,
National Aeronautics and Space Administration, Houston, Tex. Manned Spacecraft Center.
A. B. Park.
In: Remote Sensing of the Chesapeake Bay; Proc of Conference held at Wallops Station, Virginia, April 5-7, 1971: National Aeronautics and Space Administration Special Publication, NASA SP-294, p 5-47, 1972. 25 fig, 14 plate, 2 tab, 1 ref.

Descriptors: *Remote sensing, *Data collections, Satellites (Artificial), Surveys, Electromagnetic waves, Infrared radiation, Mapping, Photography, Radar, Spectroscopy, Microwaves, Chesapeake Bay.

What remote sensing is, what it can do and problems presently being studied are reviewed. Remote sensing refers primarily to sensors of electromagnetic radiation in the ultraviolet, visible, infrared and microwave regions. The activities of NASA are concerned with data acquisition and utilization of the data to reach conclusions and recommendations for action with regard to the environment. The Earth observations remote sensing program draws data from past space missions, from presently operating aircraft and from the projected ERTS and Skylab satellites. (See also W73-00101) (Knapp-USGS)
W73-00102

INDUSTRIAL WASTE POLLUTION,
John Hopkins Univ., Baltimore, Md.
For primary bibliographic entry see Field 05B.
W73-00103

SOME APPLICATIONS OF REMOTE SENSING IN ATMOSPHERIC MONITORING PROGRAMS,
Newcastle County Dept. of Natural Resources and Environmental Control, Dover, Del.
For primary bibliographic entry see Field 05B.
W73-00104

ESTUARINE TURBIDITY, FLUSHING, SALINITY, AND CIRCULATION,
John Hopkins Univ., Baltimore, Md.
For primary bibliographic entry see Field 05B.
W73-00106

REMOTE SENSING AND EXTRACTABLE BIOLOGICAL RESOURCES,
Maryland Univ., College Park.
L. E. Cronin.
In: Remote Sensing of the Chesapeake Bay; Proc of Conference held at Wallops Station, Virginia, April 5-7, 1971: National Aeronautics and Space Administration Special Publication, NASA SP-294, p 83-89, 1972. 8 ref.

Descriptors: *Remote sensing, *Chesapeake Bay, *Fisheries, Estuarine fisheries, Ecology, Data collections.

The extractable resources of the Chesapeake Bay have not been accurately measured. The organisms and materials harvested for commercial sale are recorded with reasonable accuracy, but the recreational catch and the potentially useful species and quantities are not. A research and observational program should be designed and completed for two purposes: (1) to determine experimentally and from previous experience here and elsewhere the best possible application of the unique capabilities of remote sensing to Chesapeake Bay resource problems, with special attention to the uses of aerial surveys; (2) to develop a long-term pattern for useful surveillance of Chesapeake resources. (See also W73-00101) (Knapp-USGS)
W73-00107

AGRICULTURE AND FORESTRY--IDENTIFICATION, VIGOR, AND DISEASE,
Smithsonian Institution, Washington, D.C.
For primary bibliographic entry see Field 05B.
W73-00108

RECREATIONAL USE,
Commission of Outdoor Recreation, Richmond, Va.
E. Cox.

In: Remote Sensing of the Chesapeake Bay; Proc of Conference held at Wallops Station, Virginia, April 5-7, 1971: National Aeronautics and Space Administration Special Publication, NASA SP-294, p 103, 1972.

Descriptors: *Chesapeake Bay, *Remote sensing, *Recreation, Reviews, Surveys, Data collections.

An initial problem in comprehensive outdoor recreation planning is the availability of data. Suggestions for possible development must be followed up by detailed investigation. Information must be gathered relating to topography, ground water conditions, biotic life, access to surface water, and surrounding land use. Much of this needed information is quickly discernible from high-altitude infrared color photography as well as from conventional black-and-white air photography. Thermal infrared photography can detect trends in environmental evolution. (See also W73-00101) (Knapp-USGS)
W73-00109

ENGINEERING WORKS AND THE TIDAL CHESAPEAKE,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 02L.
W73-00110

USE OF REMOTE SENSING IN SHORELINE AND NEAR-SHORE MANAGEMENT,
Maryland Dept. of Chesapeake Bay Affairs, Annapolis.
J. R. Capper.
In: Remote Sensing of the Chesapeake Bay; Proc of Conference held at Wallops Station, Virginia, April 5-7, 1971: National Aeronautics and Space Administration Special Publication, NASA SP-294, p 125-127, 1972.

Descriptors: *Remote sensing, *Chesapeake Bay, Engineering, Dams, Reservoirs, *Coastal engineering, Water management (Applied), Estuaries, Land management, Ecology, Geomorphology, Water pollution, Water pollution control.

The function of the Maryland Department of Chesapeake Bay Affairs and other agencies like it is to receive specialized information, apply it within a legislated system, and make decisions contributing to the legislative objective. Examination of a Bay resource problem from this perspective suggests problems and opportunities for the application of remote sensing technology. Shoreline activities are defined as those events taking place on land within about 200 feet of shoreline that have an effect on, or are affected by, open water. Because there are so many interests involved in shoreline use, and because the problems there are only soluble with broad public acceptance of government programs, the public information aspects of remote sensing are of prominent importance. (See also W73-00101) (Knapp-USGS)
W73-00111

PROBLEMS OF URBAN DEVELOPMENT AND GROWTH,
Geological Survey, Washington, D.C.
A. C. Gerlach, and J. R. Wray.
In: Remote Sensing of the Chesapeake Bay; Proc of Conference held at Wallops Station, Virginia, April 5-7, 1971: National Aeronautics and Space Administration Special Publication, NASA SP-294, p 129-138, 1972. 4 fig, 2 plate.

Descriptors: *Remote sensing, *Urbanization, *Chesapeake Bay, *Aerial photography, Satellites (Artificial), Land use, Water pollution sources.

Two very important problems involved in urban analysis and planning are: (1) the rapidity of land use and functional change, coupled with delays in obtaining pertinent data promptly by means of traditional techniques; (2) differences in definition and categorization of urban land uses from place to place, coupled with differences among local studies in time, scale, and purpose. To help solve these problems, the Geographic Applications Program of the U.S. Geological Survey, in close cooperation with NASA, has focused a large part of its effort upon urban change detection and the preparation of an Atlas of Urban and Regional Change, to obtain a national overview of urban conditions and to measure the environmental impact of urban growth and internal functional changes. In spite of early settlement of the Chesapeake Bay area and the function of the Bay as an important shipping lane, urbanization of its immediate fringe has lagged far behind the national average. In 1960, 70 percent of the population of the United States was urban, and samples of the still incomplete 1970 census returns indicate a substantial rise in that figure. In the 23 counties bordering the Chesapeake Bay only 25.8 percent of the population was urban in 1950; 29 percent was urban in 1960; and 30.7 percent was urban in 1970. One of the test sites for which remote sensing data are being applied to practical problems of urban planning and policy formation is the Washington, D.C., urbanized area. (See also W73-00101) (Knapp-USGS)
W73-00112

AN ELECTRICAL RESISTIVITY PROFILE IN HAWAII WITH NOVEL ELEVATION CORRECTION,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 04B.
W73-00115

COASTAL AND URBAN SURVEYS WITH IR,
Hawaii Inst. of Geophysics, Honolulu.
W. M. Adams, L. K. Lepley, C. Warren, and S. Chang.
Photogrammetric Engineering, Vol 36, No 2, p 173-180, February 1970. 9 fig, 12 ref.

Descriptors: *Remote sensing, *Water temperature, *Surface waters, *Aerial photography, *Hawaii, Surveys, Coasts, Cities, *Infrared radiation, Photogrammetry, Aircraft, Instrumentation, Methodology, Thermal stratification, Springs, Water types.
Identifiers: *Thermal water anomalies.

Remote-sensing research at the University of Hawaii involved real-time imagery of thermal anomalies with an air-borne scanner. The main effort was directed to a study and development of techniques in geophysical exploration for water-resources research utilizing the 3 to 5.5-micrometer band of infrared real-time imagery. An infrared scanner covering the 2 to 5-micrometer wavelength region was flown over the coastline of the Puna and Kau Districts on the island of Hawaii. The flight line was at an altitude of 11,000 feet in order to make each image about 1100 feet on a side. A few areas were mosaicked and mounted on aerial photographs to facilitate interpretation. Thermal anomalies were easily identifiable on early morning images, but not on midday images because no filter was used. (Woodard-USGS)
W73-00116

SOIL MOISTURE MEASUREMENT,
For primary bibliographic entry see Field 02G.
W73-00119

THE USE OF RESISTIVITY TECHNIQUES TO DELINEATE ACID MINE DRAINAGE IN GROUND WATER,
Pennsylvania State Univ., University Park. Coll. of Earth and Mineral Sciences.
For primary bibliographic entry see Field 05B.
W73-00132

BIPOLAR DIGIPOTENTIOGRATOR FOR ELECTROANALYTICAL USES. DIRECT CONVERSION OF CHARGE TO A DIGITAL NUMBER,
California Univ., Berkeley. Lawrence Berkeley Lab.
W. W. Goldsworthy, and R. G. Clem.
Analytical Chemistry, Vol 44, No 8, p 1360-1366, July 1972. 9 fig, 6 ref.

Descriptors: *Instrumentation, *Data collections, *Control systems, Potentiometers, Generators, Polarographic analysis, Integrated control measures, Mercury, Copper, Lead, Pollutant identification, Measurements, Water pollution sources.
Identifiers: *Potentiostats, *Electroanalysis, *Biopolar digipotentiogrator, Pulse height analyzer, Coulometry, Anodic stripping voltammetry, Digital integrators, Precision, Pulse summing, Signal conversion.

A bipolar digipotentiogrator has been built for the first time. It functions as a potentiostat through pulsed injection or extraction of charge to maintain a control potential, and simultaneously serves as a current to digital converter. Counting and summing these pulses in time allows the instrument to serve as an integrator. It is capable of a current measuring precision of 0.01 percent. This device is the heart of a new system which includes a digital wait-gate, a pulse height analyzer, an analyzer interface, an incremental differentiator, a voltage-step ramp generator, and a program timer. Uses of this system in polarography and anodic stripping analysis is illustrated. A single digipotentiogrator system could be made to serve several different measurement or control functions. It could, for example, measure sequentially, current related spectrometric data, perform polarography, do constant current titrations, sense temperature, and humidity, digitize specific-ion electrode and pH information, plus perform other functions. (Long-Battelle)
W73-00277

A MODIFICATION OF THE VARIAN HR-60 NMR SPECTROMETER PROBE FOR OPERATION AT VERY LOW TEMPERATURES,
California Univ., Berkeley. Dept. of Chemistry.
F. R. Jensen, L. A. Smith, C. H. Bushweller, and B. H. Beck.
The Review of Scientific Instruments, Vol 43, No 6, p 894-897, June 1972. 4 fig, 2 ref.

Descriptors: *Instrumentation, *Design, *Nuclear magnetic resonance, *Operations, *Spectrometers, Temperature, Laboratory equipment.
Identifiers: *NMR probe, NMR spectra, Sensitivity, Dewared insert.

A modification of the Varian HR-60 NMR probe gives high resolution NMR spectra at the lowest temperatures at which solutions are nonviscous. The modification effectively eliminates heat leaks to the probe body and magnet pole faces, and is capable of maintaining a constant temperature (plus or minus 0.01 degrees) over any period. The basic design is one in which the coolant gas does not come in contact with any surface other than the inner surface of a Dewar from the time it leaves a heat exchanger until it has passed through the probe and magnet area. The Varian HR-60 probe was modified to allow introduction of a completely Dewared insert. This change allows the coolant gas to enter at the bottom of the probe and pass through the Dewared insert, spinner cap, and exit tube. The receiver coil is glued to the inner wall of the Dewared insert and the leads are permanently soldered to the appropriate contacts in the probe. The Dewared insert and probe are mounted on a nonmagnetic aluminum alloy frame. With this modification spectra can be obtained with good spinning and resolution as conveniently at minus 170 degrees, or below, as at zero degrees. Due to the placement of the pickup coil, the resolution and sensitivity are superior to commercial inserts. (Long-Battelle)
W73-00278

SIGNAL-TO-NOISE ENHANCEMENT THROUGH INSTRUMENTAL TECHNIQUES. PART II. SIGNAL AVERAGING, BOXCAR INTEGRATION, AND CORRELATION TECHNIQUES,
Indiana Univ., Bloomington. Dept. of Chemistry.
G. M. Hieftje.
Analytical Chemistry, Vol 44, No 7, p 69 A-78 A, June 1972. 4 fig, 1 tab, 10 ref.

Descriptors: *Mathematical studies, *Instrumentation, Correlation analysis, Computers, Equipment.
Identifiers: *Boxcar integration, *Signal averaging, *Correlation techniques, Signal-to-noise ratio, Enhancement, Sensitivity, Signals.

Signal averaging, boxcar integration, and correlation techniques are described which provide signal-to-noise (S-N) enhancement for nonperiodic or irregular waveforms or for signals which have no synchronizing or reference wave. Signal averaging involves the instrumental superposition of a number of signal traces by sampling each signal record in the same way and storing the samples in either a digital or analog register. The boxcar integrator, which is similar to a lock-in amplifier or signal averager, can enhance a pulse signal when the channel is locked-in, or complex signals when the boxcar gate is moved from channel to channel. It is more versatile and sensitive than the signal averager for enhancement of pulse signals, but is inferior to the signal averager for enhancing complex signals. The correlation techniques for S/N enhancement are an outgrowth from information theory and depend on the relationship between a signal and a delayed version of itself (autocorrelation) or of another signal (cross-correlation). This technique is especially useful when no means is available for synchronizing a sampling system to the signal, which is necessary with the tuned and phase-lock amplifier, with the signal averager, and with the boxcar integrator. Also, autocorrelation techniques are useful in situations where the signal is often unrecognizable or impossible to detect apart from the noise. Cross-correlation is similar to autocorrelation except that the delayed signal arises from a second source, probably from the modulating function of the signal or as in phase-lock amplification, from a reference coupled to the signal modulator. (Long-Battelle)
W73-00293

A DIVER-OPERATED PLANKTON COLLECTOR,
Fisheries Research Board of Canada, St. John's (Newfoundland). Biological Station.
G. P. Ennis.
Journal Fisheries Research Board of Canada, Vol 29, No 3, p 341-343, March 1972. 2 fig.

Descriptors: *Plankton, *Plankton nets, *Sampling, *Equipment, Crustaceans, Copepods, Amphipoda, Larvae, Scuba diving, Fish, Construction, Design.
Identifiers: Arthropods, Decapods.

A plankton collecting apparatus was devised by strapping together two diver-towing vehicles and mounting a 50-cm plankton net ahead of them. It can be operated at the surface by a snorkel diver or under water by a scuba diver at 2 mph. Despite the slow speed of the apparatus it does collect the smaller planktonic organisms (including copepods, amphipods, all stages of decapod crustacean larvae, and newly-hatched fish larvae), quite efficiently. Construction details are presented. (Long-Battelle)
W73-00295

SIGNAL-TO-NOISE ENHANCEMENT THROUGH INSTRUMENTAL TECHNIQUES. PART I. SIGNALS, NOISE, AND S/N ENHANCEMENT IN THE FREQUENCY DOMAIN,
Indiana Univ., Bloomington. Dept. of Chemistry.
G. M. Hieftje.
Analytical Chemistry, Vol. 44, No. 6, p 81 A-88 A, May 1972. 4 fig, 6 ref.

Descriptors: *Instrumentation, Mathematical studies, Electronic equipment, Methodology, Spectrophotometry, Analytical techniques, Frequency.
Identifiers: *Signal-to-noise ratio, Modulation, Amplifiers, Lock-in amplifiers, Signals, Atomic absorption spectrophotometry, Interference, Atomic absorption.

Signals, problems inherent in observing signals, and some relatively simple techniques which enable better signal collection were considered for improving analytical measurements. To characterize and remove noises such as white noise, flicker noise, interference, and impulses, it is useful to examine the frequency components in a noise waveform with a noise-power spectrum (which is a plot of the noise power as a function of frequency), as well as amplitude and phase. The most commonly used property to aid in the identification and separation of noise is frequency. Thus knowing physical properties of noise, methods such as DC signal filtering, modulation, and tuned amplification can be used to eliminate noise. However, lock-in amplifiers are required to prevent frequency drift which is common to amplifiers, and such systems may be coupled to atomic absorption spectrophotometers for signal-to-noise enhancement. (Long-Battelle)
W73-00308

IMPROVED THERMOCOUPLE PSYCHROMETER FOR THE MEASUREMENT OF PLANT AND SOIL WATER POTENTIAL: I. THERMOCOUPLE PSYCHROMETRY AND AN IMPROVED INSTRUMENT DESIGN,
Commonwealth Scientific and Industrial Research Organization, Canberra (Australia). Div. of Plant Industry.
B. D. Millar.
J Exp Bot. Vol 22, No 73, p 875-890. 1971. Illus.
Identifiers: *Instrument design, Measurement, *Water potential, *Psychrometry, Respiration, Samples, Soils, *Thermocouple, Psychometer, Tissue.

This is the first paper of a series which describes: the design and operation of a thermocouple psychrometer which provides improved range of measurement, accuracy, and equilibration rate of water potential determinations of plant and soil samples, and which avoids or minimizes 6 sources of large error, one or more of which occur with previous psychrometers; and studies that provide a better understanding of the thermocouple psychrometric method. The present paper describes the main difficulties encountered with the method, examines those due to absorption phenomena, and describes an improved thermocouple psychrometer which overcomes or reduces some of these difficulties. Improvements include: chamber walls of stainless steel type 316 and samples arranged in shielding geometries to reduce delays in equilibration due to adsorption: sample holders of geometries that avoid or reduce errors of leaf resistance, absorption and tissue damage when appropriate cooling periods and tissue segments of adequate size are used; shielding arrangement of respiring tissue samples to permit thermal equilibration in the region sensed by the 'active' thermojunction; a new thermocouple assembly for increased range of measurement of water potential; sample holders that permit plant or soil samples to be accommodated in the 1 chamber.--Copyright 1972, Biological Abstracts, Inc.
W73-00327

SIGNAL CONVERSION FOR THE AUTOMATION OF TITRATIONS,
Amsterdam Univ. (Netherlands). Naturkundig Laboratorium.
J. Kragten, and M. Wijzenbeek.
Zeitschrift fur Analytische Chemie, Vol 259, No 1, p 7-11, March 28, 1972. 7 fig, 1 ref.

Descriptors: *Automation, *Instrumentation, *Automatic control, *Volumetric analysis, Zeta potential, Photometry, Laboratory equipment.
Identifiers: Potentiometric titration, Conductometry, Amperometry.

An automatic titration system is described which is suitable for all end-point techniques, such as potentiometry, conductometry, photometry, amperometry and voltammetry. The system utilizes the principle that nearly all titration signals can be converted into electric potential. These titration signals show a jump near the equivalence point. The titrant is added to the reaction system in small, exactly equivalent portions with a piston- or plunger-buret coupled to a step motor. The motor, which acts as the driving mechanism, turns a small constant angle after each titrant addition. The driving mechanism is controlled by measuring the voltage difference between the converted titration signal and a constant voltage, which corresponds to the potential jump at the equivalence point. When the voltage difference reaches a small, positive value preset into the equipment, the driving mechanism stops the titration. The accuracy of the system is dependent upon the place and steepness of the potential jump, and on the selection of the value for the constant voltage. Sample curves are included from the titration of metals with EDTA. (Pestel-Battelle)
W73-00337

A FREE FALL PROBE FOR THE MEASUREMENT OF VELOCITY MICROSTRUCTURE,
University Coll. of North Wales, Bangor. Marine Science Labs.
J. H. Simpson.
Deep-Sea Research, Vol 19, No 4, p 331-336, April 1972. 3 fig, 11 ref.

Descriptors: *Oceans, *Velocity, *Density, Thermocline, Distribution patterns, Water temperature, Shear, Turbulence, Electrodes, Currents (Water), Ocean currents, Instrumentation, Sea water.
Identifiers: Richardson's number, Free fall probe, Vertical distribution, PROTAS, Probes, Loch Ness, England, Sensors.

A probe called PROTAS (Probe Recording Ocean Temperature and Shear), for measuring small vertical scale variations in the horizontal velocity of ocean water uses a neutrally buoyant vane to overcome the problem of measuring small velocity changes. The vane is attached to a framework protruding from the probe's main body which consists of a long circular cylinder subject to a large static righting moment. Deflection of the vane relative to the vertical indicates any horizontal velocity difference between the probe and the water. An electrode measures movement of the shear-detecting vane. Using this device, velocity differences of 1 mm/sec can be detected over vertical separations down to approximately 30 cm. The probe also includes a thermistor for temperature gradient measurement so that velocity and density gradients may be compared in fresh water. The PROTAS was used in Loch Ness with results showing that the velocity gradient is concentrated into the regions of intense density gradients. Estimates of the Richardson's number in the thermocline suggest that active turbulence there is infrequent. (Mortland-Battelle)
W73-00350

ERRORS IN THE GRAN ADDITION METHOD. PART III. EXPERIMENTAL DETERMINATION OF ERRORS BY MEANS OF A FLUORIDE--SELECTIVE ELECTRODE,
Geneva Univ. (Switzerland). Dept. of Mineral and Analytical Chemistry Training.
N. Parthasarathy, J. Buffle, and D. Monnier.

Analytica Chimica Acta, Vol 59, No 3, p 447-452, May 1972. 3 fig, 2 tab, 7 ref.

Descriptors: *Electrochemistry, *Analytical techniques, Electrodes, Fluorides, Statistical methods, Least squares method.
Identifiers: *Fluoride electrode, *Gran addition method, Buffers, Errors, Ion selective electrodes.

Errors incurred in the Gran addition technique were experimentally determined with a fluoride-selective electrode. A sample of known concentration was placed in a polyethylene beaker and 20 ml of total Ionic Strength Buffer (TISAB) was added. The fluoride-selective electrode and a reference saturated calomel electrode were immersed in the solution and the emf was measured. 0.5-ml aliquots of a (1 plus 1) dilution of pure fluoride solution with TISAB were then added up to 10 ml and the corresponding potentials were measured. Results obtained in this experiment agreed with the theory proposed in previously reported parts of the study. Maximal precision can be obtained by making the concentration of the standard solution as close as possible to that of the unknown solution and by determining electrode slope very precisely. It is also necessary that the following condition be met: 1 less than R equals (V sub max times (C plus C sub s)/ (V sub o times (C sub O plus C sub S)) less than 3. (Mortland-Battelle)
W73-00353

EXTENDING THE VERSATILITY OF GRAPHIC RECORDERS,
McKee-Pedersen Instruments, Danville, Calif.
R. G. McKee, and W. Schick.
Instrument and Control Systems, Vol 45, No 7, p 55-56, July 1972. 5 fig, 2 ref.

Descriptors: *Instrumentation, Electrical equipment, *Electronic equipment, Electrical design, Data collections, Electric relays, Electric switches.
Identifiers: Recorders, Circuits, *Graphic recorders, Operational amplifiers, Differential amplifiers, Impedance selectors, Counters, Timers.

The versatility of strip chart and X-Y recorders used for signal readout can be improved by using operational interface, amplifier circuits (between instruments and recorders) to process signals prior to recording. Signal conditioning circuits can be fabricated using chopper stabilized and electrometer operational amplifiers, along with general-purpose differential amplifiers, precision millivolt sources, impedance selectors for ranging, relays and drivers for switching timers, and counters. The circuits presented for increasing recorder versatility include a DC conductance recorder circuit for resistance measurements, an AC conductance recorder circuit with a full-wave rectifier for recording low level AC signals, comparator and switching circuits for event marking capability, an integrator which automatically resets the instrument each time an integral builds up to selected potential, and an over-range alarm circuit to activate a protective device when the input reaches the E sub a. The DC recorders with frequency responses well below 100 Hz and loop gains greater than 100,000 have accuracies in the range of plus or minus 0.1 percent. (Long-Battelle)
W73-00412

RAPID VARIATIONS OF SEA SURFACE TEMPERATURE IN THE PERSIAN GULF AS RECORDED BY NIMBUS 2 HRIR,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
K. -H. Szekielda, V. Salomonson, and L. J. Allison.
Limnology and Oceanography, Vol 17, No 2, p 307-309, March 1972. 2 fig, 3 ref.

Descriptors: *Satellites (Artificial), *Remote sensing, *Air-water interfaces, *Air temperature, Air circulation, Infrared radiation, Maritime air masses, Evaporation, Distribution, Atmosphere, Telemetry, Surface waters, Water temperature, Sea breezes.
Identifiers: *Infrared radiometer, Persian Gulf, Radiometry detectors, Radiometers.

Nimbus 2 high resolution infrared radiometer (HRIR) observations over the Persian Gulf have been analyzed for cloud-free nights from June to November 1966. Temperature analysis showed that the southern part of the Persian Gulf is consistently warmer than the northern part. The spatial distribution of sea surface temperatures as observed by the satellite radiometer responded to the prevailing surface winds. Satellite radiometric observations can be used to locate large-scale air-sea interaction features. (Long-Battelle)
W73-00435

A SPECIAL CABLE FOR TOWED MAGNETOMETERS (IN RUSSIAN),
Akademiya Nauk SSSR, Kaliningrad. Institut Okeanologii.
E. V. Verzhbitsky, E. G. Mirlin, M. I. Ovsyannikov, L. P. Ol'shansky, and G. P. Veligodsky.
Okeanologiya, Vol 12, No 2, p 357-359, March/April 1972.

Descriptors: *Water sampling, *Sea water, *Optical properties, *Equipment, Shallow water, Deep water, Design, Radiation, Light intensity, Methodology, Instrumentation.
Identifiers: *Baltic Sea, Photoluminescence, Cuvette.

An original design and the principle of action of a simple device for water sampling from any depth is described. It eliminates the contact of the atmosphere and prevents pollution with foreign admixtures during sampling, water sample storage, and treatment. The cuvette part is made of glass and permits one to measure the radiation intensity along the cylindrical cuvette or the radiation diffused at a right angle to its axis. The improved operation of the water bottle-cuvette was confirmed during field research of spectral distribution of the Baltic Sea water photoluminescence. (Snyder-Battelle)
W73-00436

A SMALL SONIC TAG FOR MEASUREMENT OF LOCOMOTOR BEHAVIOUR IN FISH,
Stirling Univ. (Scotland).
A. H. Young, P. Tytler, F. G. T. Holliday, and A. MacFarlane.
J Fish Biol. Vol 4, No 1, p 57-65. 1972. Illus.
Identifiers: Fish behavior, *Salmo-Trutta, *Sonic tags, *Brown trout.

A technique for measuring the patterns and levels of swimming activity of unrestrained fish in their natural environment during a period of 24 hr is described. The fish were marked and small tags which emitted continuous ultrasonic signals by which they could be located and tracked using submerged, remotely controlled, directional hydrophones. Preliminary results obtained from 2 brown trout (Salmo trutta) showed a pronounced diurnal activity pattern and remarkably low swimming activity levels.--Copyright 1972, Biological Abstracts, Inc.
W73-00618

A LIGHTWEIGHT MARIOTTE BOTTLE FOR FIELD, LABORATORY AND HATCHERY USE,
New York State Dept. of Environmental Conservation, Livingston Manor.
R. Engstrom-Heg.
Prog Fish-Cult. Vol 33, No 4, p 227-231. 1971. Illus.
Identifiers: *Fish hatchery, *Mariotte bottle, *Sampling.

A polyethylene aspirator carboy can be fitted with a stainless steel air-inlet tube of adjustable length and provided with a series of perforated outflow screwcaps. The resulting Mariotte bottle is an easily portable constant-flow device for introducing chemicals into laboratory, hatchery, or stream waters. The bottle may be accurately preset to provide discharge rates ranging from 68 to 2500 cc/min. A table and nomographs give the proper settings for various outflow rates.--Copyright 1972, Biological Abstracts, Inc.
W73-00622

7C. Evaluation, Processing and Publication

NOMOGRAM FOR THE CONSTRUCTION OF FLOW NETS NEAR SINGULAR BOUNDARY POINTS,
Department of the Environment, Ottawa (Ontario). Inland Waters Branch.
For primary bibliographic entry see Field 02F.
W73-00018

ON THE NUMERICAL COMPUTATION OF STRATIFIED GROUNDWATER FLOW,
For primary bibliographic entry see Field 02F.
W73-00023

ESTIMATING THE T-YEAR FLOOD BY THE EXTENSION OF RECORDS OF PARTIAL DURATION SERIES,
Institute of Hydrology, Wallingford (England).
For primary bibliographic entry see Field 02E.
W73-00025

INTERNATIONAL SYMPOSIUM ON MODELLING TECHNIQUES IN WATER RESOURCES SYSTEMS.
For primary bibliographic entry see Field 06A.
W73-00090

TECHNICAL KEYNOTE ADDRESS ON REMOTE SENSING,
National Aeronautics and Space Administration, Houston, Tex. Manned Spacecraft Center.
For primary bibliographic entry see Field 07B.
W73-00102

RECREATIONAL USE,
Commission of Outdoor Recreation, Richmond, Va.
For primary bibliographic entry see Field 07B.
W73-00109

TABLES OF WATER CONTENT-DENSITY RELATIONS FOR SATURATED SOILS,
Commonwealth Scientific and Industrial Research Organization, Melbourne (Australia).
For primary bibliographic entry see Field 02G.
W73-00121

DESIGN OF ANALOG MODEL FOR AQUIFER RESPONSE STUDIES, USING A DIGITAL MODEL,
Waterloo Univ. (Ontario).
For primary bibliographic entry see Field 02F.
W73-00131

EXISTING AUTOMATION, CONTROL AND INTELLIGENCE SYSTEMS FOR METROPOLITAN WATER FACILITIES,
For primary bibliographic entry see Field 05D.
W73-00145

COMPUTER AND CONTROL EQUIPMENT.
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.

For primary bibliographic entry see Field 05D.
W73-00146

CONTROL OF COMBINED SEWER OVERFLOWS IN MINNEAPOLIS-SAINT PAUL,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00147

MODEL OF REAL-TIME AUTOMATION AND CONTROL SYSTEMS FOR COMBINED SEWERS,
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00151

COMPUTER-CONTROLLED MASS SPECTRAL CHARACTERIZATIONS OF INDUSTRIAL ORGANIC POLLUTANTS,
Environmental Protection Agency, Athens, Ga. Southeast Water Lab.
For primary bibliographic entry see Field 05A.
W73-00313

COLLABORATIVE STUDY OF METHODS FOR FREE AND TOTAL WATER IN FERTILIZER,
Tennessee Valley Authority, Muscle Shoals, Ala. Div. of Chemical Development.
For primary bibliographic entry see Field 05A.
W73-00402

AMINO ACID ANALYSIS OF SOYBEAN MEAL. INTERLABORATORY STUDY,
Agricultural Research Service, Peoria, Ill. Northern Marketing and Nutrition Research Div.
For primary bibliographic entry see Field 05A.
W73-00404

SPECTRAL ANALYSIS APPLIED TO THE STUDY OF TIME SERIES FROM THE BEACH ENVIRONMENT,
Nottingham Univ. (England). Dept. of Geography.
For primary bibliographic entry see Field 02J.
W73-00586

NUMERICAL METHOD FOR GROUNDWATER HYDRAULICS,
Environmental Protection Agency, Annapolis, Md. Water Quality Office.
For primary bibliographic entry see Field 02F.
W73-00593

OPTIMIZING FLOOD CONTROL ALLOCATION FOR A MULTIPURPOSE RESERVOIR,
Montgomery (James M.) Consulting Engineers, Inc., Pasadena, Calif.
For primary bibliographic entry see Field 04A.
W73-00636

08. ENGINEERING WORKS

8A. Structures

LIBBY DAM AND LAKE KOOCANUSA, KOOTENAI RIVER, MONTANA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.

Available from the National Technical Information Service as PB-200 538-F, $3.00 in paper copy. January 8, 1972. 106 p, 4 map, 1 photo, 7 tab, 1 chart.

Descriptors: *Flood protection, *Environmental effects, *Montana, *Dam construction, Columbia River Basin, Hydroelectric powerplants, Dams, Multiple-purpose projects, Land management, River basin development, Recreation facilities, River basin commissions, Multiple-purpose reservoirs, International joint commission, Water resources development, Wildlife habitats, Flood control, Dam construction, Reservoir storage, Floods, Water quality control, Impoundments.
Identifiers: *Environmental Impact Statements, *Lincoln County (Mont).

The Libby Dam and Lake Koocanusa Project, located in Lincoln County, Montana, in the Columbia River Basin will provide: protection to the downstream Kootenai River flood plain from spring floods, and additional flood protection to the Lower Columbia flood plain; 854,000 kilowatts of power initially to the Pacific Northwest power system; and about 13,000 acres for public recreation use. Completion of the dam will permanently impound the free flow of the river and alter fish and wildlife habitats in the area. At this time, the only alternatives, other than possible design changes, would be to abandon the project or finish construction to a lesser extent than authorized. In the United States, 4,276 acres would be irreversibly and irretrievably committed to use as roads and railroads and 24,100 acres of land and 4,750 acres of river are committed to use as a reservoir. Comment has been received from interested federal, state and local agencies. (Waldron-Florida)
W73-00040

TELLICO PROJECT, FINAL ENVIRONMENTAL IMPACT STATEMENTS.
Tennessee Valley Authority, Chattanooga. Office of Health and Environmental Science.

Available from the National Technical Information Service as PB-200 025, F-1, and F-2, $6.00 per set, $0.95 in microfiche per vol. Two vols, February 10, 1972. 462 p, 13 fig, 7 map, 20 dwg, 119 tab, 1 chart.

Descriptors: *Tennessee, *Multiple-purpose projects, *Tennessee Valley Authority, *Environmental effects, Hydroelectric power, Hydroelectric plants, Dam construction, Tennessee River, Reservoir construction, Navigation, Aesthetics, Recreation, Relocation, Turbidity, Sedimentation, Fisheries, Wildlife habitats, Water supply, Flood control, Geologic investigations, Engineering structures, Land use.
Identifiers: *Environmental impact statements, *Little Tennessee River project.

The Tellico project is a multi-purpose project on the Little Tennessee River. The major feature is a dam located about one-quarter mile above the confluence with the Tennessee River. The project involves creation of a 16,500-acre reservoir. Related industrial, commercial, residential, and recreational development will also be part of the project. Environmental impacts anticipated include a significant beneficial shift in land use from agricultural to more urbanized uses, and benefits to navigation, flood control, electric power development, recreation, employment, water supply, recreation, and fish and wildlife. Adverse impacts include: reduced trout fishing; loss of 33 miles of natural stream; loss or diminished use of certain archeological sites, agricultural production, wildlife, and some mining; family relocations; and temporary turbidity and sedimentation. Alternatives include: alternative dam sites and no construction; abandonment of the project; design alternatives; and scenic and recreational development of the river. Also included are extensive results of engineering investigations and economic studies on the project. (Grant-Florida)
W73-00041

PEARL RIVER COMPREHENSIVE BASIN STUDY (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Water Resources Council, Washington, D.C.

Available from the National Technical Information Service as PB-199 742-D, $3.00 in paper copy. June 3, 1971. 9 p.

Descriptors: *Louisiana, *Erosion control, *Flood control, *Environmental effects, Mississippi, Non-structural alternatives, Rural areas, Land management, Runoff, Streams, Creeks, Wildlife habitats, Hardwood, Forest management, Recreation, Land use, Watershed management, Reservoirs, River basin development, Wildlife conservation, Comprehensive planning.
Identifiers: *Environmental Impact Statements, *Pearl River Basin (Miss. and La.).

The Pearl River Basin is located in east central and southwest Mississippi and in southeastern Louisiana. The proposed plan for the basin consists of an early action program to meet immediate and near future needs of the basin and a framework program to serve as a guide for future development. The early-action program would provide flood protection to urban and rural areas. Structural measures included in the early-action portion of the comprehensive plan consist of multiple-purpose reservoirs, floodwater retarding structures, multiple-purpose structures, channel development and a pleasure boatway along the Pearl River to the vicinity of Edinburg. The land treatment measures would result in decreased erosion and runoff from upland areas. Unavoidable adverse effects include the loss of free-flowing streams; loss of high value wildlife habitat in hardwood bottomlands; and the loss of productive forest, crop and pasture lands. Various structural and non-structural alternatives were considered but none would produce benefits of the scope and variety expected as a result of the proposed early-action program. (Waldron-Florida)
W73-00049

TOWN OF COUSHATTA--FLOOD PREVENTION PROJECT MEASURE TWIN VALLEY RC AND D PROJECT, LOUISIANA (DRAFT ENVIRONMENTAL STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from the National Technical Information Service as PB-207 575-D, $3.00 in paper copy. March 16, 1972. 10 p, 1 map, 1 tab, 1 append.

Descriptors: *Louisiana, *Environmental effects, *Canal construction, *Flood protection, Check structures, Channels, Drainage systems, Open channels, Canals, Flood Control, Flood routing, Drainage systems, Water control, Drainage, Channel improvement, Wildlife habitats, Erosion control, Turbidity, Wetlands, Waterfowl, Fisheries, Ditches.
Identifiers: *Environmental Impact Statements, *Coushatta (Louisiana), *Twin Valley RC and D Project.

The project measure is located in the town of Coushatta, Red River Parish, Louisiana. 7.6 miles of flood prevention channels are proposed along with appurtenant structures for water control and for the protection of the channels. The project will reduce floodwater damages by 63 percent and enhance land for the future expansion of the town of Coushatta. Wetland habitat for fish and waterfowl will be created on 200 acres. Erosion problems will be reduced and hazards to public safety minimized. A small area of deer, quail, and rabbit habitat and about 20 acres of woodland will be lost. There will be temporary turbid conditions in the channels during construction. Floodwater retarding structures were considered as an alternative to channel improvement. Due to the flat topography these structures cannot be constructed. Smaller capacity channels were not ac-

ceptable because they would not provide a 100-year level of protection to urban development. The project measure provides for both present and future generations, improved flood protection and development of fish and wildlife habitat. Irreversible commitments of land resources stem from areas needed for channel construction. (Beardsley-Florida)
W73-00055

ENGINEERING WORKS AND THE TIDAL CHESAPEAKE,
Virginia Inst. of Marine Science, Gloucester Point.
For primary bibliographic entry see Field 02L.
W73-00110

RESERVOIR CONSTRUCTION ON LOWLAND RIVERS OF THE USSR (O SOZDANII VODOKHRANILISHCH NA RAVNINNYKH REKAKH SSSR),
Moscow State Univ. (USSR).
K. N. D'yakonov.
Akademiya Nauk SSSR Izvestiya, Seriya Geograficheskay a, No 5, p 55-62, September-October 1971. 4 tab, 14 ref.

Descriptors: *Reservoirs, *Reservoir construction, *Rivers, *Floods, Agriculture, Land, Land use, Forest management, Groundwater, Economics.
Identifiers: *USSR, *Volga-Kama Cascade, *Lowlands, Biogeocenoses.

Problems encountered in the design of large hydrostations on lowland rivers in the USSR are examined in connection with reservoir inundation. Lowland reservoirs, which represent 88% of all reservoirs in the country, are divided into reservoirs in lower reaches of rivers and reservoirs in upper and middle reaches. Areas of flooded agricultural and forested lands around reservoirs of the Volga-Kama Cascade in east European USSR are tabulated. (Josefson-USGS)
W73-00195

EFFECT OF MAJOR DAM AND RESERVOIR CONSTRUCTION ON GEOMORPHOLOGICAL PROCESSES IN RIVER VALLEYS,
Moscow State Univ. (USSR). Dept. of Geography.
N. I. Makkaveev.
Geomorphology, No. 2, p 106-110, April-June 1970. 18 ref. (Translated from Geomorfologiya, No 2, p 28-34, April-June 1970).

Descriptors: *Geomorphology, *Reservoir construction, *Dam construction, *Rivers, *Valleys, Slopes, Shores, Channels, Tributaries, Winds, Waves (Water), Currents (Water), Water levels, Backwater, Sediments, Deposition (Sediments), Sediment transport, Erosion, Abrasion, Seasonal.
Identifiers: *USSR, *Base level, Corrading streams, Longshore currents, Longshore transportation, Baymouth bars, Lowlands.

Large storage reservoirs have a significant effect on the geomorphology of river valleys. A rise of the base level caused by dam construction, together with changes in stream regime, produce a sequence of interrelated geomorphic processes. Upstream from the edge of the backwater produced by the dam, regressive aggradation gradually spreads upriver, resulting both in a rise in the valley floor and in a rise in water level. Within the reservoir itself, waves, longshore currents, seasonal changes in water level, and gravitational processes on shore slopes combine to produce a distinctive shoreline relief, characterized by large areas of recurring inundation, lagoons closed off by baymouth bars, and high cliffs retreating under the impact of wave abrasion. Downstream from the dam, severe downcutting of the river channel gives rise to a stream terrace, whose relative height reaches a maximum near the dam and gradually declines downstream. Downcutting of the channel in the main stream in turn tends to lower the base level in lower reaches of tributaries. (Josefson-USGS)
W73-00198

SETTLEMENT OF PIPELINE ON THAWING PERMAFROST,
Cambridge Univ. (England). Dept. of Engineering.
A. C. Palmer.
Transportation Engineering Journal, American Society of Civil Engineers Vol 98, No TE3, Paper 9090, p 477-491, August 1972. 10 fig, 16 ref, append.

Descriptors: *Settlement (Structural), *Permafrost, *Thawing, *Subsidence, *Pipelines, *Alaska, Oil industry, Ice, Cryology, Subsidence, Construction, Soil mechanics.

A buried oil pipeline in permafrost will thaw the frozen soil around it, and will settle as the thawed soil consolidates. Because the amount of ice in the soil varies from point to point along the pipe alinement, the settlement will be uneven, and will induce bending in the pipe. Thaw settlement estimates from single boreholes give no information about the possible magnitude of differential settlements, and instead statistical measures of the intensity of fluctuations in thaw settlement have to be used. Alternative sources of the required data are suggested, and two different ways of estimating the effects on the pipe are described, one way being based on random process theory and the other on statistical simulation. The flexural stiffness of the pipe modifies the settlement, and methods of taking this effect into account are explained. (Knapp-USGS)
W73-00201

PREDICTIVE METHODS FOR FOULING BEHAVIOR,
Heat Transfer Research, Inc., Alhambra, Calif.
For primary bibliographic entry see Field 05G.
W73-00218

ANALYSIS AND DESIGN OF HYPERBOLIC COOLING TOWERS,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00225

DESIGN AND OPERATION OF PROCESS WASTE HEAT BOILERS,
Struthers Wells Corp., Warren, Pa.
H. J. Streich, and F. G. Feeley, Jr.
Chemical Engineering Progress, Vol 68, No 7, p 57-63, July 1972. 8 fig.

Descriptors: *Boilers, *Design criteria, *Operation and maintenance, Design, Boiler feed water, Steam, Powerplants, Hazards, Chemical industry, Corrosion control, Leakage, Heat exchangers.
Identifiers: *Waste heat boilers, Watertube boiler, Power boilers.

The process heat recovery boiler (waste heat boiler or process gas cooler) has evolved from a marriage between the conventional shell and tube heat exchanger and the firetube type boiler. Combined thoughts of the designer and the operator concerning potential operating problems and hazards involved in this equipment are presented. Failure problems are categorized and illustrated with examples. Problems of water loss and waterside corrosion are also discussed. Waste heat boilers in today's increasingly large chemical process plants are (by whatever name they are called) power boilers. It is obligatory to recognize this fact now and resort to the more sophisticated steam purification equipment used by power boiler designers. (Oleszkiewicz-Vanderbilt)
W73-00229

THE GEYSERS GEOTHERMAL POWER PLANT,
Pacific Gas and Electric Co., San Francisco, Calif.
For primary bibliographic entry see Field 05G.
W73-00230

CAVITATION IN ELEMENTS OF HYDRAULIC STRUCTURES AND METHODS OF CONTROLLING IT,
R. S. Gal'perin.
Hydrotechnical Construction, No 8, p 726-732, Aug 1971. 8 fig, 1 tab, 7 ref.

Descriptors: *Cavitation, Aeration, Spillways, Roller gates, Pitting, Roughness (Hydraulic), Radial gates, Baffles, Model tests, Prototype tests, Jets, Vacuum, Conduits, Hydraulic structures.
Identifiers: *Cavitation index, *Cavitation control, Chute blocks, Flip buckets, Free flow, Slots, Energy dissipators, USSR, Vertical-lift gates.

Model and prototype tests were performed at the All-Union Design and Scientific-Research Institute for Hydraulic Structures (Russia) to determine cavitation characteristics for hydraulic structures. Baffles in water conduits, surface irregularities on spillways, vertical-lift gates, Tainter gates, and energy dissipators were tested. A critical cavitation index was established for baffles in conduits, vertical-face baffles, rounded projections on the flow surface, and several sloping baffles. Allowable heights for surface irregularities were established for velocities from 30-50 m/sec. From model-prototype comparisons, the location, condition, and characteristics of cavitation at vertical-lift gates can be accurately determined. Tainter gates operating with free discharge are not likely to cavitate. Zones of vacuum on energy dissipators are usually found with hydraulic models by using piezometers and pressure fluctuation gages. Models lead to underestimation of the cavitation hazard. Complete prevention may not be economical when dangerous operation is only temporary or intermittent. Aeration of the wall layer is a promising method for protecting elements of structures. Prototype tests involved exposure from 6 to 100 days to develop cavitation information. (USBR)
W73-00328

TOWN OF PORTAGE LAKE, MAINE, PRELIMINARY DESIGN REPORT, POLLUTION CONTROL PROGRAM.
Jordan (Edward C.) Co., Inc., Portland, Maine.
For primary bibliographic entry see Field 05G.
W73-00461

MAINTENANCE, DREDGING, NORWALK HARBOR, CONNECTICUT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Waltham, Mass. New England Div.

Available from the National Technical Information Service as PB-208 650-D, $3.00 in paper copy, $0.95 in microfiche. March 27, 1972. 13 p, 3 map.

Descriptors: *Connecticut, *Environmental effects, *Operation and maintenance, *Dredging, Spoil banks, Basins, Harbors, Navigation, Transportation, Economic impact, Sediments, Sediment load, Turbidity, Benthos, Marine animals, Marine plants, Aquatic habitats, Maintenance, Water policy, Ships, Channel improvement.
Identifiers: *Environmental Impact Statements, *Norwalk Harbor (Conn), *Coastal waters.

This proposed project involves periodic maintenance dredging of the inner 10-foot entrance channel and basin to the authorized dimensions in Norwalk Harbor, Connecticut. An estimated 75,000 cubic yards of sediment will be removed and spoiled at an approved offshore spoil area. The proposed dredging will allow continued, safe navigation in the inner entrance channel and basin

of the harbor. Considering the importance of this harbor as a shipping and landing port for a variety of commercial goods, it is imperative to the overall economy of the area that a dependable navigation channel and basin continue to exist. It is not foreseen that the dredging of sediment from the channel and basin will have any long-term adverse effects on the marine biota and residuum natural resources of the area. However, ephemeral increases in turbidity and biochemical oxygen demand; burial, smothering, and displacement of benthic organisms; and possible re-suspension of some toxic heavy metals and non-biodegradable chemical pollutants are possible consequences of the dredging and open-water disposal. If maintenance dredging is not undertaken, shoaling will continue until eventual passage of vessels will be denied altogether. (Ellis-Florida)
W73-00464

EIGHTEEN MILE CREEK WATERSHED, SOUTH CAROLINA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from the National Technical Information Service as PB-198 973-D, $3.00 in paper copy, $0.95 in microfiche. April 1971. 15 p.

Descriptors: *South Carolina, *Flood protection, *Environmental effects, *Land management, Watershed management, Watershed protection, Flood control, Erosion control, Soil conservation, Cultivation, Multiple-purpose reservoirs, Water resources development, Storage reservoirs, Municipal water, Sediment control, Dam construction, Water conservation, Wildlife habitat, Flooding, Fisheries, Stream fisheries.
Identifiers: *Environmental Impact Statements, *Eighteen Mile Creek Watershed (SC).

Eighteen Mile Creek Watershed Project involves the application of conservation methods on about 1,000 acres. About 650 acres of eroding uplands will be stabilized. Structural works will consist of two floodwater-retarding structures and one reservoir for flood storage and water supply. 1.9 miles of stream channel will be improved. The environmental impacts include the following: reduction of flood damage, reduction of sediment delivery into Hartwell Reservoir, stabilization of about 650 acres of eroding land, supplement of the water supply, provision for lakes for fishing, provision for landuse conversions, and the development of wildlife habitats. Adverse environmental effects include the following: elimination of three miles of stream fishing; elimination or limitation of wildlife and agricultural uses of areas occupied by pools, dams, and spillways; and reduction of woodland production on lands converted to pasture. Project alternatives, based upon varying levels of flood protection, different flood prevention structural works, and alternate sources of water, presently fail to offer a feasible choice. Although primarily to meet existing needs, the planned project will permit continued land use in the future, however, inundation will destroy some habitat and stream fisheries. (Crow-Florida)
W73-00467

RIVER ROUGE FLOOD CONTROL PROJECT, WAYNE COUNTY, MICHIGAN (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Detroit, Mich.

Available from the National Technical Information Service as PB-207 451-D, $3.00 in paper copy, $0.95 in microfiche. January 3, 1972. 31 p, 1 fig, 3 tab.

Descriptors: *Michigan, *Environmental effects, *Channel improvement, *Flood control, Flood protection, Channel flow, Rivers, Riverflow, River training, Aquatic habitats, Wildlife habitats, Spoil banks, Excavation, Concrete construction, River beds, Floods, Water control, Water management (Applied).
Identifiers: *Environmental Impact Statements, *Wayne County (Mich).

This flood control project consists of enlargement and realignment of the mainstream of the River Rouge from the navigation turnbasin at the Detroit-Dearborn city limits to Michigan Avenue in Dearborn, Michigan. The major beneficial impact of the proposed project will be the reduction of flood hazard. The operation of local sewage treatment facilities will also be safeguarded by the enlarged channel capacity. The length of the River will be shortened 8600 feet by eliminating most of the natural river bends which provide slack areas conducive to the spawning of fish and other aquatic life. The construction of the concrete channel will necessitate the removal of tree and bush cover now bordering the stream and the filling of natural river bottom. Thus, the cover provided the existing species of wildlife will be removed in this sector. Marshy and wooded areas near the river will be eliminated by use of these areas for disposal of excavated materials. Some open fields and woodlots upland from the river will be removed. Alternatives considered include levees and floodwalls, diversion channels, impounding of flood flows in upstream reservoirs, basin-wide channel improvements, and no action. (Ellis-Florida)
W73-00468

NORTHEAST FLOOD STUDY, SUSQUEHANNA RIVER BASIN FLOOD CONTROL AND MINE SUBSIDENCE IN WYOMING VALLEY, PENNSYLVANIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Baltimore, Md.

Available from the National Technical Information Service as PB-207 567-D, $3.00 in paper copy, $0.95 in microfiche. September 27, 1971. 33 p, 1 map, 4 tab.

Descriptors: *Pennsylvania, *Environmental effects, *Flood protection, *Levees, Bank stabilization, Embankments, Flood control, Floodways, Rivers, Steel piles, Social impact, Economic impact, Flood damages, Sediment load, Aesthetics, Landscaping, Water pollution, Water quality, Water management (Applied), Turbidity, Water pollution sources.
Identifiers: *Environmental Impact Statements, *Wyoming Valley (Pa), Wilkes-Barre (Pa).

This proposed project will restore to design conditions approximately 4 3/4 miles of levee and floodwall in Pennsylvania's Wyoming Valley which have dropped due to coal mine subsidence. The basic elements of improvement include raising existing levees and steel sheet-pile wall, installing new steel sheet-pile wall and providing riprap for bank stabilization. The existing environmental setting will not be significantly changed by the proposed improvements because most of the flood control system is already constructed. The benefits will be seen in the social and economic well-being of the residents, many of whom have experienced disasterous floods in past years. Levees requiring repair will be stripped of sod, riprap, debris or objectionable material during construction. The temporary effect of these activities may raise the pollution potential of increased sediment loads in the river from runoff, and may adversely affect water quality in the Susquehanna River. Turbidity may be temporarily increased. However, the river is badly polluted and damage to fish and wildlife as a result of construction activities will be minimal. Where steel sheet-piling will be used, the aesthetic appeal is less than in the areas where properly seeded and landscaped earth levees exist. (Ellis-Florida)
W73-00469

LAKE WOHLFORD, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Federal Power Commission, Washington, D.C.

Available from the National Technical Information Service as PB-207 457-D, $3.00 in paper copy, $0.95 in microfiche. March 2, 1972. 88 p, 2 map, 23 photo, 8 tab, 7 append.

Descriptors: *California, *Environmental effects, *Permits, *Hydroelectric project licensing, Dams, Regulation, Conduits, Reservoir storage, Power system operation, Conveyance structures, Wildlife habitats, Water supply, Water management (Applied), Flood protection, Economic impact, Flood control, Rivers, Recreational facilities, Hydroelectric plants, Water resources development.
Identifiers: *Environmental Impact Statements, *Lake Wohlford (Calif).

This action consists of approval for the constructed Lake Wohlford Project which has been in existence for 50 years in San Diego County, California. The major project facilities are a diversion dam, water conduit system, two powerhouses, and a terminal storage reservoir. The project waters have improved the wildlife habitat in the area by providing a year round water supply in what would otherwise be an arid region. Waters transported through the conduit system have been the major source of water supply in the Escondido area. The project provides water both for agricultural and domestic uses and has contributed directly to the agricultural and domestic development of the area. Lake Wohlford Dam provides flood protection with regard to the Escondido Creek. The project also provides low cost, clean power to the area. No significant adverse effects on environmental quality can be foreseen as a result of continued protection of this constructed project as proposed in the application. Alternatives to the re-licensing and continued operation of the project as proposed would be to discontinue, curtail, or make some significant change in the project operation. (Ellis-Florida)
W73-00470

WESTERN UNIT FLOOD PROTECTION PROJECT, BILLINGS, MONTANA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Omaha, Nebr.

Available from the National Technical Information Service as PB-204 575-F, $3.00 in paper copy, $0.95 in microfiche. January 1972. 24 p, 1 map, 1 dwg.

Descriptors: *Montana, *Environmental effects, *Flood control, *Diversion structures, Diversion, Drainage systems, Flood protection, Levees, Water management (Applied), Routing, Water control, Ditches, Excavation, Pipes, Flood flow, Wildlife habitats, Bank erosion, Streamflow, Rivers, Floodwater, Water policy, Flood routing.
Identifiers: *Environmental Impact Statements, *Billings (Mont).

The proposed improvement involves the construction of a diversion project along the western edge of Billings, Montana, to intercept flood flows from various irrigation and drainage ditches and natural drainage areas and to conduct these flows around developed areas of the city. The project will extend from Cove Ditch to the Yellowstone River. The project will protect much of the City of Billings against a standard project flood. Agricultural production on 66 acres of irrigated farmland needed for diversion channel right-of-way will be eliminated. Soil erosion into Hogans Slough and Canyon Creek will increase during project construction. Construction, excavation and dirt hauling activities will cause temporary dust and noise. The wildlife habitat offered by minor marsh areas that result along Hogans Slough will be lost because of construction activities. Alternative

solutions considered include reservoirs, levees, flood plain evacuation and flood proofing, diversion, channel improvements, zoning, and contributions of these measures. (Ellis-Florida)
W73-00471

HURRICANE CREEK WATERSHED STRUCTURAL PROJECT, MEASURE, KENTUCKY (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Soil Conservation Service, Washington, D.C.

Available from the National Technical Information Service as PB-203 511-F, $3.00 in paper copy, $0.95 in microfiche. January 1972. 30 p, 1 map.

Descriptors: *Kentucky, *Environmental effects, *Watershed management, *Channel improvement, Erosion control, Flood control, Land management, Habitat improvement, Water management (Applied), Floodwaters, Flood protection, Flood plains, Check structures, Sediment control, Sediment load, Water quality control, Water pollution control, Retardance, Flooding, Stream improvement, Engineering structures, Habitats, Aesthetics.
Identifiers: *Environmental Impact Statements, *Measure (Kentucky), *Hurricane Creek Watershed.

This proposed project consists of accelerating the ongoing land treatment program, installing three floodwater retarding structures and improving about four miles of channel in the Hurricane Creek Watershed, Measure, Kentucky. The proposed improvement will reduce floodwater, sediment and erosion problems throughout the 4300 acre project area and provide a 100 year flood protection to 170 flood plain acres. The sediment pools of the three floodwater retarding structures will be available for waterfowl use and as an improved fish habitat. The vegetative cover to be established on 69 acres of streambank and spoil areas will provide wildlife food and cover. In addition, water from the sediment pools may be released during periods of low flow to augment stream flow. The improvements will also improve water quality by controlling pollution sources and reducing stagnated and polluted water areas. The project will take 48 acres of agricultural and forestry land for sediment pools and structure areas; interrupt wildlife, agricultural and forestry use of land in the sediment pools; and delay the use of 126 acres in other affected areas. Additionally a one mile reach of intermittent stream will be inundated and water quality may be temporarily disturbed by sediment. (Ellis-Florida)
W73-00472

REHABILITATION AND BETTERMENT PROGRAM, CASCADE IRRIGATION DISTRICT (DRAFT ENVIRONMENTAL STATEMENT).
Bureau of Reclamation, Boise, Idaho. Region 1.

Available from the National Technical Information Service as PB-206 765-D, $3.00 in paper copy, $0.95 in microfiche. February 15, 1972. 21 p, 2 map.

Descriptors: *Washington, *Diversion dams, *Irrigation canals, *Environmental effects, Diversion structures, Diversion, Irrigation districts, Dependable supply, Fish ladders, Structures, Anadromous fish, Pumping plants, Concrete construction, Maintenance, Water supply, Wildlife habitat, Canals, Streamflow.
Identifiers: *Environmental Impact Statements, *Cascade Irrigation Dist (Wash).

The project will replace a section of the damaged Cascade Irrigation District by rerouting the water further down the Yakima River in Kittitas Valley, Washington, near the city of Ellensburg. The project involves rehabilitation of a diversion dam on the Yakima River and construction of a new inlet to the irrigation canal. To enhance anadromous fish spawning a fish ladder will be built upstream from the dam. Concrete lining almost three miles of canal will result in a reduction of wildlife use through a decrease in accessibility. The project will provide the Irrigation District with an adequate supply of water. Construction of a pumping plant and surge tank will result in permanent alteration of the landscape of a small hill. Alternatives include repair of the damaged canal section, the use of shallow wells and pumping facilities, construction of a new diversion dam downstream and continuation of temporary facilities. Alternatives were considered unfeasible either because of inadequate flow, increased cost or the possibility of further damage to the canal. (Nielsen-Florida)
W73-00474

PORT EVERGLADES HARBOR, BROWARD COUNTY, FLORIDA (DRAFT ENVIRONMENTAL STATEMENT).
Army Engineer District, Jacksonville, Fla.

Available from the National Technical Information Service as PB-208 873-D, $3.00 in paper copy, $0.95 in microfiche. May 5, 1972. 50 p, 1 map, 2 tab.

Descriptors: *Florida, *Environmental effects, *Dredging, *Harbors, Channel improvement, Coastal engineering, Jetties, Bodies of water, Excavation, Inland waterways, Navigation, Fisheries, Aquatic habitat, Recreation, Ships, Turbidity, Water pollution sources, Oil spills, Spoil banks, Reefs.
Identifiers: *Environmental Impact Statements, *Port Everglades (Fla).

The recommended project involves deepening and modifying harbor dimensions at Port Everglades, Broward County, Florida., in order to handle larger ships. An increase in shipping activities is expected as a result of the proposed harbor improvement. Some dredged material, if suitable, will be utilized for beach replenishment and will be used to create an artificial fishing reef. Material not suitable for either purpose will be placed on diked upland areas. A fishing walkway on the south jetty will improve fishermen access in the area. There will be a temporary increase in turbidity during construction. Increased traffic of larger vessels may increase pollution potential in the harbor. The basic alternative is non-action, leaving the harbor in the present condition. Offshore mooring facilities were also considered. However, offshore mooring will not afford the shelter and safety of that offered by the harbor and the risk of oil spills would be greater. A small amount of fish habitat will be displaced as a result of the project. However, the long-term productivity should be enhanced. (Beardsley-Florida)
W73-00477

GULF INTRACOASTAL WATERWAY--MOUTH OF COLORADO RIVER, TEXAS (NAVIGATION, FLOOD CONTROL) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.

Available from the National Technical Information Service as PB-198 849-D, $3.00 in paper copy, $0.95 in microfiche. February 10, 1971. 12 p.

Descriptors: *Texas, *Colorado River, *Environmental effects, *Channel improvement, *Flood protection, Flood control, Navigation, Recreation facilities, Wildlife habitats, Rivers, Dredging, Turbidity, Commercial fishing, Water quality, Spoil banks, Diversion, Channels, Water management (Applied), Silting, River training sedimentation.
Identifiers: *Environmental impact statements, *Colorado River (Tex), Gulf Intracoastal Waterway (Tex), Matagorda (Tex).

This project provides for shallow-draft navigation; flood control improvements; enhancement of fish and wildlife; and development of outdoor recreation in the lower 7 mile reach of the Colorado River from the mouth of the river to its junction with the Gulf Intracoastal Waterway near Matagorda, Texas. The jettied navigation channel will provide a savings in transportation costs to commercial fishing boats and benefit general navigation through reduced hazards for vessels traversing the channel to the Colorado River. Diversion of the River will reduce flood hazards and associated economic losses to residences along the lower portion of the River. Spillage of excavated material, short-term turbidity and siltation during dredging operations will have adverse effects on the quality and quantity of commercial and sport fishing. The disposition of excavated material in the upland prairie spoil disposal area and construction of recreation facilities will eliminate some wildlife habitats. Alternatives considered included various other structural changes in the river and no project. (Ellis-Florida)
W73-00481

GAS HOUSE COVE (EAST HARBOR FACILITY) SAN FRANCISCO MARINA SMALL BOAT HARBOR, CALIFORNIA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, San Francisco, Calif.

Available from the National Technical Information Service as PB-198 974-D, $3.00 in paper copy, $0.95 in microfiche. March 1971. 7 p, 1 map.

Descriptors: *California, *Breakwaters, *Environmental effects, *Waves (Water), Surges, Coastal structures, Harbors, Concrete construction, Marinas, Recreation facilities, Aquatic habitats, Benthos, Water quality, Boating, Storm surge, Coastal engineering.
Identifiers: *Environmental Impact Statements, *Gas House Cove (Calif).

Shortly after construction it became apparent that the eastern harbor of San Francisco Small Craft Harbor, Gas House Cove, was subject to damage from excessive wave action. To alleviate this problem, this proposed project will construct a 117-foot concrete pile breakwater to connect the two existing breakwaters. The project will eliminate the wave damages to the facilities and make the harbor safer and more appealing to the current users and eliminate the necessity of moving some boats out of the harbor during storms. The breakwater will serve as a substrata for many marine organisms which are unable to live in bottom mud. There will be an elimination of the benthos in a small area and a temporary disruption of the benthos over a larger area during construction. Flushing may be reduced and coliform bacteria may increase in the harbor area. During the proposed construction, precautions will be taken to prevent degradation of water quality. None of these results is expected to have significant biological effects upon the immediate area or upon the bay. Various alternatives considered were found less feasible than the proposed action. (Ellis-Florida)
W73-00482

BROWNSVILLE, WASHINGTON SMALL BOAT BASIN (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Seattle, Wash.

Available from the National Technical Information Service as PB-199 882-D, $3.00 in paper copy, $0.95 in microfiche. March 18, 1971. 10 p, 1 map.

Descriptors: *Washington, *Environmental effects, *Marinas, *Dredging, Recreation facilities, Boating, Breakwaters, Navigation, Disposal, Spoil banks, Shellfish, Water quality, Recreation demand, Social impact, Water utilization, Economic impact, Basins, Boats.

Identifiers: *Environmental Impact Statements, *Brownsville (Wash), *Puget Sound.

The proposed project involves construction of protected moorage facilities for recreational boats at Brownsville, Washington, on Puget Sound. The proposed action will ultimately provide moorage facilities for 334 boats. Approximately 10 acres of bottom lands in Burke Bay will be dredged to construct the project. Construction of two composite timber-pile and rock breakwaters will utilize about 2 1/2 acres of the bottom in Port Richard. Ultimately 12 1/2 surface acres will be converted from unrestricted navigation use to protected marina use. The dredged material will be placed on adjacent wooded and grassed uplands; no dredged material will be deposited in water or tidelands. The proposed project will render 2 1/2 acres of Burke Bay's bottom unusable for shellfish due to construction of the breakwater but shellfish are expected to reestablish themselves in the boat basin. However, harvest of these shellfish will be difficult and could be undesirable if the water quality in the basin deteriorates. The treated timber-pile and breakwater will create an adverse visual effect on the setting, particularly at low tide. Various alternatives considered include no action and dry land storage. (Ellis-Florida)
W73-00483

MAINTENANCE OF NEWTOWN CREEK, NEW YORK, NAVIGATION PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.

Available from the National Technical Information Service as PB-206 578-D, $3.00 in paper copy, $0.95 in microfiche. January 21, 1972. 9 p, 1 map.

Descriptors: *New York, *Channel improvement, *Dredging, *Environmental effects, Decision making, Coordination, Planning, Water management (Applied), Channels, Maintenance, Spoil banks, Disposal, Navigation, Hazards, Harbors, Ocenas, Water pollution control, Water pollution sources, Social aspects, Recreation.
Identifiers: *Environmental Impact Statements, *Newtown Creek (N.Y.).

The project involves maintenance dredging of the existing federal channel in Newtown Creek, New York, and its tributaries to the authorized project dimensions. The spoil will be deposited in the approved dumping area in the New York Bight in the Atlantic Ocean. The existing channel is about 3.8 miles long and forms a part of the New York Harbor. The proposed action will permit continuous access to commercial channels by deep draft vessels yielding transportation savings and will help alleviate navigation difficulties, thereby reserving the possibility of oil spills. The spoiling will contribute to the regional problem of spoil disposal in the ocean. The only alternative is that of no maintenance. Upland disposal will be used if the contractor finds a suitable site. Formal communications, in the form of transmittal of project plans, have been exchanged with the Fish and Wildlife Service, and the Environmental Protection Agency regarding their concern about the impact of the project on the environment. (Widman-Florida)
W73-00484

MAINTENANCE OF GREAT SOUTH BAY AND PATCHOGUE RIVER, NEW YORK, NAVIGATION PROJECT (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, New York.

Available from the National Technical Information Service as PB-206 577-D, $3.00 in paper copy, $0.95 in microfiche. January 21, 1972. 9 p, 1 map.

Descriptors: *Dredging, *Channel improvement, *New York, *Environmental effects, Maintenance, Channels, Adoption of practices, Water management (Applied), Benthic flora, Benthic fauna, Turbidity, Waterfowl, Aesthetics, Social aspects, Navigable waters, Water quality control, Food chains.
Identifiers: *Environmental Impact Statements, *Great South Bay, *Pathogue River (N.Y.).

The proposed action involves maintenance dredging of the existing federal channel in Great South Bay and Patchogue River, New York, to its authorized project dimensions. The work will be performed by contract dredge with spoiling in an upland disposal site. The improvement will permit efficient and safe water delivery of petroleum products and permit fish to continue, yielding economic benefits to the surrounding communities. Adverse environmental effects which cannot be avoided include temporary increase in turbidity during the dredging process which will have an impact on the water quality; spoiling in the upland sites which will continue to alter some of the natural environmental habitat of the waterfowl of this region; and some disruption of benthic organisms from dredging. There will also be some noise pollution and aesthetic impairment. The only alternative to the action is not to perform maintenance. An alternative to upland disposal would be ocean disposal. The removal of bottom materials may be irreversible if the benthic organisms cannot reestablish the original conditions. (Widman-Florida)
W73-00486

KAWAIHAE HARBOR FOR LIGHT DRAFT VESSELS, HAWAII COUNTY, (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Corps of Engineers, Honolulu, Hawaii. Pacific Ocean Div.

Available from the National Technical Information Service as PB-202 288-D, $3.00 in paper copy, $0.95 in microfiche. December 1970. 20 p, 2 map, 8 tab.

Descriptors: *Hawaii, *Environmental effects, *Harbors, *Navigation, Breakwaters, Basins, Water resources development, Project planning, Reefs, Dredging, Economic justification, Economics, Access routes, Shellfish, Reefs, Recreation, Recreation demand, Aesthetics, Boating, Marinas, Recreation facilities, Turbidity.
Identifiers: *Environmental Impact Statements, *Kawaihae Harbor (Hawaii).

The project involves construction of an access channel, anchorage basin and a protective breakwater to accommodate approximately 300 small-craft in Hawaii County, Hawaii. The project provides for a 14-acre berthing basin and a 650-foot-long main access channel which will be protected by a 1,225 foot long breakwater. The project will alter the physical dimensions and condition of the site. The project will provide a safe harbor for commercial and recreational craft. Adverse environmental effects include alternation of approximately 12.2 acres of shallow reef area into emergent protective structures, destruction of some marine shellfish due to deeptening a submerged reef, deepening approximately 20 acres of water from 1 to 7 feet, and some temporary turbidity during construction. Alternatives include foregoing construction which would require small craft to use the deep-draft harbor, and use of an alternative site for the harbor which was not recommended by state officials. Irreversible and irretrievable commitments of resources include the 12.2 acres of submerged reef land which would be filled, the 19.8 acres which would be deepened by dredging, and the marine life buried and destroyed by the dredging. (Widman-Florida)
W73-00489

REHABILITATION OF THE NOLICHUCKY PROJECT (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Tennessee Valley Authority, Chattanooga, Tenn. Office of Health and Environmental Science.

Available from the National Technical Information Service as PB-204 844F, $3.00 in paper copy, $0.95 in microfiche. Report 7VA-OHES-EIS-72-2 March 10, 1972. 59 p, 3 fig, 3 tab, 1 append.

Descriptors: *Tennessee Valley Authority, *Environmental effects, *Rehabilitation, *Dams, Silts, Water quality control, Water quality, Silting, Rivers, Reservoirs, Water supply, Safety factors, Standards, Deposition (Sediments), Aquatic life, Fisheries, Wildlife habitats, Turbidity, Benefits, Costs, Feasibility, Project purposes, Waterfowl, Land use, Flood flow.
Identifiers: *Environmental Impact Statements, *Nolichucky Project (Tenn).

The project consists of the rehabilitation of a substandard hydro project located in Greene County, Tennessee, and the development and management of a waterfowl sanctuary combined with an environmental education and nature study program. The rehabilitation involves the strengthening of the Nolichucky project dam by placing additional concrete on the downstream face of the spillway. After rehabilitation the project will serve as an effective silt trap thereby improving the water quality of the river downstream and the Douglas Reservoir. Trapping the silt will reduce numerous undesirable downstream conditions. Proposed management activities will greatly improve the status of upland wildlife populations. Some releases of silt to the river downstream from the dam and some shifting of the siltflats within the reservoir will continue to occur during flood flows but to a lesser extent than has been experienced. Minor increases in turbidity and some dust and noise will occur during construction. The retirement of the one generating unit now in active service will require a small increase in the generation from alternate power sources. Various alternatives considered and found less feasible include construction of a new dam and different modifications to the present dam. (Ellis-Florida)
W73-00496

OCEAN OUTFALL EXTENSION PROJECT (WPC-CAL-468), CARMEL SANITARY DISTRICT, CARMEL, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Environmental Protection Agency, San Francisco, Calif.
For primary bibliographic entry see Field 05G.
W73-00497

WEST FORK DES MOINES RIVER, JACKSON, MINNESOTA, LOCAL PROTECTION PROJECT (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Rock Island, Ill.
For primary bibliographic entry see Field 04A.
W73-00498

SAMMAMISH RIVER, WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).

Available from the National Technical Information Service as PB199 888-D, $3.00 in paper copy, $0.95 in microfiche. May 1971. 9 p, 2 map.

Descriptors: *Washington, *Environmental effects, *Channel improvement, *Dredging, Sediment control, Stream improvement, Channels, Rivers, Spoil banks, Disposal, Navigation, Recreation facilities, Recreation, Boating, Turbidity, Ditches, Water quality, Fish, Habitats, Aquatic habitats, Waterfowl, Recreation demand, Benthic flora, Benthic fauna.
Identifiers: *Environmental Impact Statements, *Sammamish River (Wash).

The project, located in King County, Washington, will involve channel improvements to the Sammamish River in order to deepen the entrance channel extending from Kenmore Bridge to Lake Washington. The proposed action will provide safe access to an upstream marina, private docks, and a public boat launching ramp. The channel improvement will require the dredging of approximately 38,000 cubic yards of material which will be deposited within the existing land fill area north of the channel. Impounding dikes will be placed around the disposal area. Discharge of all dredged materials will be within the impoundments and sufficient retention time will be provided so that sediments will settle. Temporary turbidity associated with the operation will have an adverse effect on water quality and interfere with fish passage and rearing. Construction of the project will permanently remove approximately 2 acres of marsh area that is now available as bird and fauna habitat. Aquatic organisms occupying the 8 acres of bottom to be removed will be lost, but will reestablish their numbers within two or three years. Foregoing action will permit existing hazards to safe navigation to persist. The only other alternative is to vary channel dimensions. (Ellis-Florida)
W73-00503

NAVIGATION PROJECT, GREAT SOUTH BAY, AND PATCHOGUE RIVER, NEW YORK (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District. New York.

Available from the National Technical Information Service as PB199 451-F, $3.00 in paper copy, $0.95 in microfiche. May 28, 1971. 28 p, 1 map.

Descriptors: *Environmental effects, *Channel improvement, *Dredging, *New York, Navigation, Channels, Harbors, Bays, Transportation, Shallow water, Recreation, Fish, Wildlife resources, Turbidity, Water resources development, Excavation, Turbidity, Sedimentation, Shipping, Spoil banks.
Identifiers: *Environmental Impact Statements, *Patchogue River (NY), *Great South Bay (NY).

Great South Bay and the Patchogue River, New York, form a barge transportation system between New York Harbor and adjacent communities. The existing depth of this channel is not sufficient to meet the transportation needs of shippers. An increase in the existing mean low water depth from 8 to 10 feet would lower the accident rate and reduce channel deposition. The improvement plan is designed to dredge the bay and channel to a depth of 10 feet over a distance of 2.4 miles and to add a turning basin in the channel with an average width of 285 feet and a depth of 11 feet. The environmental effects of the proposed plan include the elimination of the shoaling problem on both sides of the River, increased recreational use of the affected area, and the elimination of bulkhead damage along the channel. Temporary increase in turbidity during construction will have a minimal impact on water quality. However, no permanent adverse environmental effects would result from implementation of the plan. Since no adverse effects would result, the no-implementation alternative was not given serious consideration. (Bradley-Florida)
W73-00504

BAYOU CODEN, ALABAMA NAVIGATION (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Mobile, Ala.

Available from the National Technical Information Service as PB199 453-F, $3.00 in paper copy, $0.95 in microfiche. March 17, 1971. 30 p, 1 map.

Descriptors: *Alabama, *Environmental effects, *Channel improvement, *Dredging, Spoil banks, Excavation, Navigation, Transportation, Economic impact, Commercial fishing, Aquatic environment, Mud flats, Disposal, Benthos, Bayous, Basins, Turbidity, Salinity, Habitats, Social aspects.
Identifiers: *Environmental Impact Statement, *Bayou Coden (Ala).

The proposed navigation improvement will provide a project channel about three miles long with a turning basin in the vicinity of Bayou Coden, Alabama. The area will be opened to larger draft vessels and the commercial activity along the bayou will intensify as a result of the project. The project will temporarily disrupt the aquatic environment during construction by increased turbidity in the vicinity of the discharge. Material from the seaward section of the channel will be spoiled on a relatively unproductive mudflat where fish are sparce and grass beds absent. This material is similar to that presently comprising the mud flat and should provide a similar habitat for benthic organisms. Spoil from the bayou section will be placed in disposal areas used previously for maintenance materials and will be diked to prevent the material from spreading out into the adjacent marsh. The project may increase salinities near the channel, particularly within the channel bottoms. Alternatives considered include varying channel depths along the same general alignment and no development. Comments from interested agencies are included. (Ellis-Florida)
W73-00505

BEACH EROSION PROJECT, DELAWARE COAST PROTECTION PROJECT, DELAWARE (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Philadelphia, Pa.

Available from the National Technical Information Service as PB199 454-F, $3.00 in paper copy, $0.95 in microfiche.

Descriptors: *Delaware, *Environmental effects, *Beach erosion, *Shore protection, Berms, Dunes, Recreation, Seashores, Sands, Shores, Coasts, Erosion, Beaches, Coastal engineering, Soil erosion, Tidal effects, Waves (Water), Economic impact, Social aspects, Aesthetics, Atlantic Ocean, Dredging, Borrow pits, Turbidity, Fishing.
Identifiers: *Environmental Impact Statements, *Beach erosion projects.

This project provides for improvements along the Atlantic Coast of Delaware extending from Cape Henlopen to the Maryland State line at Fenwick Island. Improvements will involve combined beach erosion control and hurricane protection consisting of beach widening by placement of suitable sand, construction of a dam, periodic beach nourishment, planting of dune grass and placing of sand fences on top of the dunes. Approximately 24.5 miles of beaches will be preserved for the use and enjoyment of future generations. Additionally, the hurricane protection measures will enhance the potential use of the protected areas. The borrow areas for beach fill material are located two to four miles inland and in the Indian River Bay and Back Bay areas. It has been indicated that the use of certain borrow areas and dredging might have an adverse environmental impact. However, such impact may be minimized or avoided by the selection of sites in cooperation with other agencies. With the possible exception of the borrow areas, and a temporary increase in turbidity, no potentially adverse effects have been revealed. Alternatives considered include a system of levees, increased periodic nourishment and no development. (Ellis-Florida)
W73-00506

GULF INTRACOASTAL WATERWAY, OFFATTS BAYOU, TEXAS (NAVIGATION) (FINAL ENVIRONMENTAL IMPACT STATEMENT).

Available from the National Technical Information Service as PB199 972-F, $3.00 in paper copy, $0.95 in microfiche. June 16, 1971. 31 p.

Descriptors: *Texas, *Environmental effects, *Channel improvement, *Gulf of Mexico, *Dredging, Spoil banks, Disposal, Channels, Excavation, Inland waterways, Safety, Aquatic habitats, Retention, Marshes, Marsh management, Transportation, Navigation, Water resources development, Water circulation, Bayous, Vegetation effects, Waterfowl, Estuarine environment, Estuaries.
Identifiers: *Environmental Impact Statements, *Offatts Bayou (Tex), *Gulf Intracoastal Waterway.

The navigation project, located in Galveston County, Texas, provides for construction of a shallow draft channel extending from the Gulf Intracoastal Waterway into Offatts Bayou, a distance of about 2.2 miles. The proposed enlarged channel will reduce the probability of marine accidents and provide low cost water transportation which will insure the continued operation and probable expansion of the industries located along Offatts Bayou. The proposed channel is expected to improve water circulation into the bayou with probable improvement for marine life. Spoil dredged in Offatts Bayou will be deposited on land sites avoiding marsh areas insofar as possible. The spoil areas will be leveed to prevent spillage into the marshes and to afford sufficient retention time to clarify the dredging water prior to its return to the bayou. Spoil excavated from West Galveston Bay will be placed in existing unleveed open-water spoil areas which will impair water circulation to some extent and remove some productive shallow bay bottoms. Spoiling effects on the bay may temporarily eradicate some vegetation and impair the estuarine character of the bay and some habitats. Localized turbidity may also result. The only alternative is to forego the project. (Ellis-Florida)
W73-00507

EVERETT HARBOR, WASHINGTON--TRAINING DIKE AND BREAKWATER (DRAFT ENVIRONMENTAL IMPACT STATEMENT).

Available from the National Technical Information Service as PB200 374-D, $3.00 in paper copy, $0.95 in microfiche. May 10, 1972. 8 p.

Descriptors: *Washington, *Environmental effects, *Navigation, *Dikes, Channel flow, Breakwaters, Estuaries, Fisheries, River basins, Harbors, Water quality, Structures, Bays, Wildlife habitats, River training, Water management (Applied), Embankments, Channel improvement.
Identifiers: *Environmental Impact Statements, *Everett Harbor (Wash).

The project consists of an extension of an existing training dike around Everett Harbor in western Washington. The harbor has a deepwater approach through Puget Sound and extends approximately four miles along the easterly shore of Port Gardner Bay. The existing raining dike has not been sufficient to prevent wave action from damaging the small commercial boats and pleasure craft that use the river channel. The proposed action would raise the southerly 4,400 feet of the training dike to an elevation of 18 feet above mean low water. In addition, the proposed plan would extend the training dike 1500 feet. Adverse environmental effects include the conversion of 13 acres of estuary bottom to landfill and the loss of some fish and wildlife resources due to increased turbidity. Beneficial environmental effects include the creation of new habitats for marine fish, and partial protection of the boat basin from wave action. Alternatives were limited to consideration of alternative designs to improve the existing structure, or no

modification at all, resulting in continued storm and wave damage. (Bradley-Florida)
W73-00508

FLOOD CONTROL ON SAGINAW RIVER, MICHIGAN AND TRIBUTARIES, FLINT RIVER AT FLINT, SWARTZ AND THREAD CREEKS (SECTIONS C-1 AND D) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Detroit, Mich.

Available from the National Technical Information Service as PB207 077-D, $3.00 in paper copy, $0.95 in microfiche. January 10, 1972. 19 p, 1 map.

Descriptors: *Michigan, *Flood control, *Environmental effects, *Channel improvement, Levees, Flood protection, Bank erosion, Basins, Drainage systems, Tributaries, Watersheds (Basins), Sediments, Water quality, Channel erosion, Water supply, Sediment load, Flood frequency, Aesthetics.
Identifiers: *Environmental Impact Statements, *Flint (Mich), *Saginaw River (Mich).

The project consists of channel realignments and modifications of approximately 11,000 feet of the main stem of the Flint River and of approximately 8,900 feet of Swartz and Thread Creeks, tributaries of the Flint River near Flint, Michigan. The flood control project is designed to accomodate the maximum flood of record. To accomplish this the plan provides for a concrete-lined channel and concrete floodwalls for the river, and an improved earth channel with raised levees along certain sections of the tributaries. Desirable environmental impact is limited to flood control protection for approximately 455 acres of land that includes a concentrated industrial complex. The adverse environmental effects include the loss of biological communities through excavations and construction of a concrete channel, increased stream sedimentation, and the removal of trees and brush from a small park. The use of upstream storage sites to reduce the flood stages is one alternative proposal, however, this, as well as abandonment of the project or the use of non-structural techniques for flood protection would not be adequate to protect the affected area from seasonal flooding. (Bradley-Florida)
W73-00509

GULF INTRACOASTAL WATERWAY, CHOCOLATE BAYOU, TEXAS (NAVIGATION) (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Galveston, Tex.

Available from the National Technical Information Service as PB198 872-D, $3.00 in paper copy, $0.95 in microfiche. February 11, 1971. 9 p.

Descriptors: *Texas, *Environmental effects, *Dredging, *Channel improvement, *Saline water barriers, Navigation, Bayous, Bays, Engineering structures, Gulf of Mexico, Basins, Irrigation systems, Irrigation water, Spoil banks, Turbidity, Wildlife habitats, Benthos, Water resources development, Area redevelopment, Saline water intrusion, Channelization.
Identifiers: *Environmental Impact Statements, *Chocolate Bayou (Tex), *Coastal waters.

The Chocolate Bayou navigation project is a side channel to the Gulf Intracoastal Waterway located about 26 miles west of Galveston, Texas. This proposed project includes deepening and widening a privately constructed channel and construction of an additional five miles of channel, a turning basin at the head of the navigation channel, and a basin to prevent saltwater intrusion into the upper reaches of the stream. The navigation improvements will stimulate industrial and commercial activities resulting in economic betterment of the area. The saltwater barrier will prevent movement of salt water upstream into irrigation water sources. Harmful effects to the environment include: approximately 170 acres of low lying lands displaced by the straightening and enlargement of the channel, spoil disposal temporarily eliminating vegetation on existing spoil banks and upland spoil disposal areas, some loss of habitat and fish and wildlife cover, alteration of some marsh areas, a temporary increase in turbidity in the bayou and bay, and temporary elimination of benthic organisms in excavated areas. Foregoing improvement is the only apparent alternative. Comments from interested state and federal agencies are included. (Ellis-Florida)
W73-00512

8B. Hydraulics

GENERALIZATION OF THE SEMI-EMPIRICAL THEORY OF TURBULENCE TO FLOWS NEAR ROUGH SURFACES WITH VARIOUS MODES OF ROUGHNESS,
I. K. Nikitin.
Fluid Mechanics-Soviet Research, Vol 1, No 3, p 44-52, May-June 1972. 6 fig, 2 tab, 8 ref.

Descriptors: *Fluid mechanics, *Flow, *Turbulence, *Surfaces, *Roughness (Hydraulic), Walls, Boundary layers, Drag, Velocity, Tubes, Channels, Model studies, Photography, Equations.
Identifiers: *USSR, Fluid dynamics, Prandtl-Karman logarithm velocity distribution.

The concept of a boundary layer ('near-wall sublayer') in a universal two-layer model of turbulent flow can be used for all uniform flows near smooth and rough walls. On the basis of this concept and by using Prandtl's semiempirical theory of turbulence, flows over surfaces with arbitrary roughness properties are investigated for drag and velocity distribution. The solutions are equally applicable to smooth and rough walls, regardless of the type of surface and mode of manifestation of the roughness properties. New and unique relationships are derived for computing flow near walls for all types of surface roughness and for all stages of its manifestation. (Josefson-USGS)
W73-00030

TURBULENCE IN THE VISCOUS SUBLAYER NEAR A PLANE WALL,
B. A. Kader.
Fluid Mechanics-Soviet Research, Vol 1, No 3, p 53-57, May-June 1972. 1 fig, 18 ref.

Descriptors: *Fluid mechanics, *Flow, *Turbulence, *Viscosity, *Walls, Turbulent boundary layers, Reynolds number, Velocity, Vortices, Statistical methods, Equations.
Identifiers: *USSR, Pulsation, Navier-Stokes equations.

The problem of a viscous sublayer can be reduced to a description of the effects of a wall on the turbulent pulsation field, which is assumed to be completely known outside the sublayer. It is shown theoretically that pulsations in a viscous sublayer are strongly elongated in a longitudinal direction and that turbulent friction (Reynolds stresses) near the wall decays as the third power of distance from the wall. This deduction is confirmed by statistical analysis of a number of references cited. (Josefson-USGS)
W73-00031

PRESSURE FLUCTUATIONS AT THE BOUNDARY OF A TURBULENT FLOW,
V. M. Ljatkher, and L. V. Smirnov.
Fluid Mechanics-Soviet Research, Vol 1, No 3, p 58-64, May-June 1972. 7 fig, 1 tab, 7 ref.

Descriptors: *Fluid mechanics, *Flow, *Turbulent flow, *Pressure, *Boundaries (Surfaces), Boundary processes, Boundary layers, Cavitation, Velocity, Shear stress, Structures, Spillways, Fluctuations, Correlation analysis, Equations, Walls.
Identifiers: *USSR, Pulsation, Navier-Stokes equations, Kinematics, Oscillograms.

The relationship between pressure pulsations and the fixed boundary of turbulent flow with a kinematic flow structure is considered. Experimental data are presented on the effects of phase transitions in fluid flow on the structure of pressure pulsations. These effects are frequently the direct cause of destruction of structure facings subject to cavitating flow. (Josefson-USGS)
W73-00032

THE FORMATION OF REGULAR COMPONENTS IN A RANDOM FIELD OF TURBULENT FLUCTUATIONS WITH UNSTEADY GROWTH OF THE BOUNDARY LAYER,
V. M. Tkachenko.
Fluid Mechanics-Soviet Research, Vol 1, No 3, p 65-69, May-June 1972. 4 fig, 2 ref.

Descriptors: *Fluid mechanics, *Stochastic processes, *Turbulence, *Boundary layers, *Fluctuations, Flow, Vortices, Reynolds number, Frequency, Velocity, Flotation, Spectrometers.
Identifiers: *USSR, Pulsation, Oscillographs.

Results of experimental investigations of turbulent pressure pulsations at the nose of a well-streamlined body of circular cross-section at Reynolds numbers up to 2 x 10 to the seventh power are presented. Short-term growth and subsequent decay of the intensity of regular components of the turbulent pressure field were observed only during nonstationary motion of the body. The fundamental frequency and its higher harmonics are proportional to the momentary velocity of motion at the instant of maximum pulsation intensity. Evidence for the hydrodynamic nature of these phenomena is discussed. (Josefson-USGS)
W73-00033

SOME CHARACTERISTICS OF A TURBULENT BOUNDARY LAYER WITH A POSITIVE PRESSURE GRADIENT AND INJECTION,
P. P. Lugovskoi, and B. P. Mironov.
Fluid Mechanics-Soviet Research, Vol 1, No 3, p 70-75, May-June 1972. 4 fig, 6 ref.

Descriptors: *Fluid mechanics, *Flow, *Turbulent boundary layers, *Pressure, *Injection, Velocity, Porosity, Porous media, Profiles, Surfaces, Distribution, Measurement, Equations.
Identifiers: *USSR.

Measurement results are presented of the distribution of the concentration of substances injected at the point of displacement of a turbulent boundary layer in the presence of a positive longitudinal pressure gradient. With $dP/dx=0$, it is shown that similar velocity and pressure profiles exist at a permeable surface. Within the accuracy limits of the experiment, no relation was observed between concentration profiles and magnitude of the longitudinal pressure gradient. (Josefson-USGS)
W73-00034

SOME QUESTIONS ON THE EFFECT OF INJECTION ON A TURBULENT BOUNDARY LAYER,
V. P. Mugalev.
Fluid Mechanics-Soviet Research, Vol 1, No 3, p 76-81, May-June 1972. 4 fig, 7 ref.

Descriptors: *Fluid mechanics, *Flow, *Turbulent boundary layers, *Injection, Pressure, Gases, Coolants, Heat transfer, Heat flow, Flow rates, Velocity, Porous media, Profiles, Walls.
Identifiers: *USSR, Fluid statics, Heat exchange.

The supply of gas through a porous surface exerts considerable influence on the average characteristics of a turbulent boundary layer. The two physical phenomena discussed are: (1) change in static pressure across the boundary layer, with injection; and (2) effect of heat exchange intensification in the turbulent boundary layer with small coolant flow rates. The appearance of this effect may be related to the influence of specific flow conditions and their interaction. (Josefson-USGS)
W73-00035

MEASUREMENT OF THE SPECTRUM OF THE LONGITUDINAL COMPONENT OF THE PULSATION VELOCITY IN THE TURBULENT BOUNDARY LAYER OF A NON-NEWTONIAN FLUID,
Yu. F. Ivanyuta, I. D. Zheltukhin, and N. A. Sergievskii.
Fluid Mechanics-Soviet Research, Vol 1, No 3, p 82-90, May-June 1972. 12 fig, 13 ref.

Descriptors: *Fluid mechanics, *Non-Newtonian flow, *Turbulent boundary layers, *Turbulence, *Velocity, Friction, Viscosity, Reynolds number, Polymers, Aqueous solutions, Tubes, Walls, Surfaces, Anemometers, Calibrations, Measurement, Frequency analysis.
Identifiers: *USSR, Pulsation, Polyacrylamide, Spectrograms.

Results of measurements of the intensity and spectrum of the longitudinal component of pulsation velocity in a turbulent boundary layer in water flows and polyacrylamide aqueous solutions are presented. Measurements were made with a thermo-anemometer in a boundary layer at the wall of a hydrodynamic tube with a working section area of about 110 x 120 mm, a working section length of about 600 mm and a capacity of about 80 liters. The presence of a polymer additive, which does not alter the intensity of turbulence, leads to quenching of high-frequency components of the pulsation velocity and to a decrease in surface friction. (Josefson-USGS)
W73-00036

TRANSPORT OF SOLID PARTICLES BY TURBULENT FLOWS,
For primary bibliographic entry see Field 02J.
W73-00037

VELOCITY DISTRIBUTION FAR OFF DOWNSTREAM AT THE WATER SURFACE OF A SUBMERGED JET,
Imatran Voima Osakeyhtio, Helsinki (Finland). Nuclear Power Project Group.
Y. S. El Mahgary.
In: International Association for Hydraulic Research, p 176-181, 1971. 12 fig, 5 ref.

Descriptors: *Jets, *Laboratory tests, *Outlets, *Velocity, Thermal pollution, Reynolds number, Water quality, Water pollution, Thermal powerplants, Water temperature, Temperature, Mixing, Hydraulics.
Identifiers: *Velocity distribution, *Schlichting solution, Submerged jets, Jet profile, Jet diffusion, Finland.

Experiments were carried out in order to determine the velocity distribution at the surface of a submerged jet far off downstream. In this region Schlichting solution for the free jet cannot be applied directly. The effects both of Reynolds number and of submersion depth were studied. The velocity profiles deviate considerably from the free jet profile at higher Reynolds numbers, whereas the velocity drop along the axis of a submerged jet could be represented roughly by the free jet law. In addition, the velocity drop slows down by decreasing the submersion depth. (Oleszkiewicz-Vanderbilt)
W73-00071

DILUTION OF BUOYANT TWO-DIMENSIONAL SURFACE DISCHARGES,
Minnesota Univ., St. Anthony Falls Hydraulic.
For primary bibliographic entry see Field 05B.
W73-00073

EVALUATING WATER SURFACE HEAT EXCHANGE COEFFICIENTS,
Pacific Gas and Electric Co., Emeryville, Calif.
P. D. Hindley, and R. M. Miner.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY8, Proc. Paper 9118, p 1411-1426, August 1972, 3 fig, 2 tab, 2 ref.

Descriptors: *Hydraulic models, *Models, *Heat exchangers, Hydraulics, Prototypes, Atmosphere, Evaporation, Temperature, Testing, *Thermal pollution, Water pollution, Heated water, Cooling, Wind, Meteorological data, Mathematical models.
Identifiers: *Heat exchange coefficient, *San Francisco Bay Model, Windspeed, Cooling basins, Thermal discharges.

Field measurements of the water surface heat exchange coefficient, K, can be obtained using the methodology presented. The method was developed in conjunction with a hydraulic model study of a thermal discharge. A prototype power plant's thermal discharge can be simulated on the model, and the resulting increased temperature field measured. Using model results, an improved prediction of the prototype field is possible if an adjustment is made for model-prototype differences in surface heat exchange. Previously, water surface heat exchange coefficients have been computed using empirical equations and meteorological data. The method presented provides an alternate means of evaluating K. Data required are time-temperature histories of two or three moderately sized cooling basins and certain meteorological information. (Oleszkiewicz-Vanderbilt)
W73-00074

COMBINING OPTIMIZATION WITH SURFACE-WATER FLOW,
ENWATS, Cambridge, Mass.
For primary bibliographic entry see Field 06A.
W73-00098

SUPERCRITICAL FLOW OVER SILLS AT INCIPIENT JUMP CONDITIONS,
Indian Inst. of Tech., New Delhi. Dept. of Applied Mechanics.
K. S. Karki, S. Chander, and R. C. Malhotra.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY10, Paper 9235, p 1753-1764, October 1972. 6 fig, 1 tab, 12 ref, append.

Descriptors: *Supercritical flow, *Hydraulic jump, *Hydraulic models, Open channel flow, Froude number, Mathematical models, Hydraulics, Standing waves, Turbulent flow, Energy dissipation.

A laboratory investigation was made of the conditions responsible for the stabilization of the hydraulic jump in a rectangular, horizontal-bed channel with a square-shaped bottom sill, when flow is at the incipient jump condition. A theoretical analysis was based upon the momentum and continuity principles. A formula is given for the design of the sills, when the ratio of the sill height to the upstream depth is smaller than 1.25. A relationship between the drag experienced by the sill and the upstream Froude number is also given. The theoretical formulation was checked by laboratory experimentation. (Knapp-USGS)
W73-00114

NUMERICAL COMPUTATION OF STRATIFIED NEARLY HORIZONTAL FLOWS,
Wimpey (George) and Co. Ltd., Hayes (England). Wimpey Central Lab.
J. P. Grubert, and M. B. Abbott.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY10, Paper 9300, p 1847-1865, October 1972. 8 fig, 2 tab, 11 ref, 3 append.

Descriptors: *Stratified flow, *Hydraulics, *Equations, Hydraulic jump, Seiches, Salinity, Density stratification, Computer programs.

The Euler equations of a two-layer fluid are solved using an implicit difference scheme for one-dimensional flow. The scheme has second order accuracy and is linearly nondissipative; all of its error is phase error. Data are presented for the scheme in a physically realistic way, to avoid nonlinear instabilities, and a control procedure for this purpose is described. The scheme is well behaved and reasonably fast in operation. It cannot, however, accommodate hydraulic jumps. (Knapp-USGS)
W73-00117

UNIVERSITY OF CINCINNATI URBAN RUNOFF MODEL,
Michigan Univ., Ann Arbor. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05G.
W73-00118

TRACER TESTS OF EDDY DIFFUSION IN FIELD AND MODEL,
Hydraulics Research Station, Wallingford (England).
For primary bibliographic entry see Field 05B.
W73-00136

RIVER REGIME: RESEARCH AND APPLICATION,
Hydraulics Research Station, Wallingford (England).
P. Ackers.
Journal of the Institution of Water Engineers, Vol 26, No 5, p 257-274, July 1972. 4 fig, 1 tab, 28 ref.

Descriptors: *Sediment transport, *Channel morphology, *Alluvial channels, Hydraulic models, Bed load, Suspended load, Hydraulics, Discharge (Water), Streamflow, Meanders, Braiding.

The concept of channel regime is reviewed by summarizing the analyses of data from canals, from rivers and the theoretical background. Although many regime analyses have been based on field data, laboratory research on sediment transport and small-scale studies of stable channels in alluvium are also relevant. Meandering was found to be more likely in channels with high sediment concentrations than in those with low concentrations; the meandering tendency increased with an increase in slope. Several stream types were observed, including (1) those in which the banks were protected by the adhesion of a layer of silt and clay, (2) those which eroded their banks but remained straight, and (3) others that shoaled or meandered. Streams with clayey banks were narrower and swifter flowing than other channels. Shoaled and meandered streams were wider. Slope did not show good correlation with discharge, being much influenced by sediment concentration. The stream geometry depended on the highest flows when discharge varied with time, rather than on the long-term average flow. (Knapp-USGS)
W73-00143

REDUCING ICE FORMATION AT NAVIGATION DAMS,
Army Engineer District, St. Paul, Minn.
H. W. Harich.

Journal of the Waterways, Harbors and Coastal Engineering Division, American Society of Civil Engineers Vol 98, No WW3, Paper 9114, p 343-355, August 1972. 5 fig, 4 tab, 1 ref.

Descriptors: *Ice jams, *Dams, *Aeration, *Gates, *Mississippi River, Navigation, Missouri, Locks, Channels.
Identifiers: *Ice control.

Increasing the turbulence at the movable gates of the Mississippi River Navigation Dams in the St. Paul District by discharging over bulkheads rather than under the gates prevents severe icing at the dam. Movement of the gates is facilitated substantially, but maintenance cost on the bulkheads is increased. Aeration facilities, culverts through the earth dams, and slots through emergency spillways, increase dissolved oxygen in downstream slackwaters and benefit fish life by reducing stagnation. (Knapp-USGS)
W73-00202

SURFACE JET MODEL FOR HEATED DISCHARGES,
Vanderbilt Unit., Nashville, Tenn. Dept. of Environmental and Water Resources Engineering.
L. H. Motz, and B. A. Benedict.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 98, No HY1, Paper 8669, p 181-199, January 1972. 10 fig, 4 tab, 23 ref.

Descriptors: *Hydraulic models, *Jets, *Models, *Mathematical models, Heated water, Rivers, Streams, Thermal pollution, Mixing, Diffusion, Thermal stratification, Turbulent flow, Water temperature, Water pollution, Laboratory tests, Velocity, Entrainment.
Identifiers: *Heated jets, Two-dimensional jets, Jet trajectory, Velocity ratio, Laboratory data, Drag coefficient, Jet entrainment.

A system of equations is developed which, when solved numerically, predicts the jet trajectory, width, velocity, and temperature decrease for the case of a two-dimensional surface jet. The results of field and laboratory experiments indicate that entrainment is reduced as the discharge angle is reduced from 90 deg. to 60 deg. and 45 deg., thus, the drag coefficient decreases as the velocity ratio is increased. The results of five surveys indicate that the entrainment coefficient was reasonably constant for three surveys at one field site even when the velocity ratio was changed. The results also indicate that entrainment is a function of the ratio of the ambient width to the discharge width, which was different at each of the field sites studied. The observed field values of the drag coefficient appear to be a function of the velocity ratio and agreed well with the values observed in the laboratory. (Oleszkiewicz-Vanderbilt)
W73-00215

MODELING OF THERMAL DISCHARGES IN SHALLOW ESTUARIES,
Tracor, Inc., Austin, Tex. Ocean Sciences and Water Resources.
For primary bibliographic entry see Field 05B.
W73-00222

NONLINEAR DYNAMIC ANALYSIS OF COOLING TOWER,
Harza Engineering Co., Chicago, Ill.
C. Yeh.
Journal of the Power Division, American Society of Civil Engineers, Vol 98, No PO1, Paper 8983, p 49-63, June 1972. 15 fig, 13 ref.

Descriptors: *Cooling towers, *Dynamics, *Finite element analysis, Thermal powerplants, Wind pressure, Cooling, Mathematical studies, Mathematics, Structures, Deflection.
Identifiers: *Nonlinear systems, Thin shell structures.

The finite element method is employed to study the nonlinear dynamic effect of a strong wind gust on a cooling tower. Geometric nonlinearities associated with finite deformations of the structure are considered but the material is assumed to remain elastic. Load is applied in small increments and the equation of motion is solved by a step-by-step integration technique. The cooling tower will collapse under a wind gust of maximum pressure 1.2 psi (8.27 kN/m2). The collapse is caused by a local buckling phenomenon along the waist of the cooling tower. The responses of the structure before collapse are presented and compared with a linear solution. These results have demonstrated the importance of considering nonlinear behavior in the analysis. (Oleszkiewicz-Vanderbilt)
W73-00228

SIGNIFICANCE OF DISPENSING WITH SURGE CHAMBERS TO LOWER THE COST OF HYDROELECTRIC STATIONS,
N. N. Arshenevskii, and Yu. N. Trubitsyn.
Hydrotechnical Construction, Vol 9, p 811-817, Sept 1971. 4 fig, 3 tab, 11 ref.

Descriptors: *Surge tanks, *Water hammer, Surges, Penstocks, Turbines, Bypasses, Vibration, Transients, Costs, Pressure, Pressure head, Hydraulic structures, Water pressure.
Identifiers: USSR, Runaway speed, Hydrodynamic pressure, Guide vanes, Wicket gates, Load rejection.

No clear instructions regarding location of surge chambers nor permissible length of penstocks are available. Slow closure of turbine guide vanes to prevent surges may not be a solution for very long penstocks because the unit may reach full runup speed after shedding the load. Increasing penstock diameter is possible, but the increased cost of the installation may be greater than the cost of the surge chamber. Use of idling discharges through auxiliary piping to reduce water hammer is suggested. A table shows physical and operating characteristics for 7 Russian hydro installations. Operation of idling discharges is discussed, including 2 examples at existing plants. Sizing of valve diameters for idling discharges is presented. An editorial note containing reservations about the authors' technical proposal precedes the article. (USBR)
W73-00324

TURBULENT TRANSFER CHARACTERISTICS OF SETTLING PHENOMENON,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulic and Water Power.
For primary bibliographic entry see Field 02J.
W73-00545

LONGITUDINAL DISTRIBUTION OF MATTERS SETTLING TO THE BED IN SETTLING BASINS,
Technical Univ. of Istanbul (Turkey). Dept. of Civil Engineering.
For primary bibliographic entry see Field 02J.
W73-00546

SIMULATION TECHNIQUE FOR SUSPENDED AND BED LOAD FOR SILT EJECTOR,
Central Water and Power Research Station, Poona (India).
For primary bibliographic entry see Field 02J.
W73-00547

EXPERIMENTAL STUDIES OF THE INFLUENCE OF SOLID PARTICLES ON SOME TURBULENCE CHARACTERISTICS IN PIPES,
Technische Hochschule, Hanover (West Germany). Franzius-Institut fuer Grund- un Wasserbau.
I. Kazanskij.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Vol I, p 45-54, 1972 (release date). 9 fig, 1 tab, 28 ref.

Descriptors: *Turbulent flow, *Vortices, *Bed load, *Saltation, *Suspended load, Sediment transport, Traction, Closed conduit flow, Turbulence, Pipe flow.

Experimental investigations were made of the low frequency part of turbulence in the presence of high concentrations of rigid particles in a two-phase flow in a horizontal pipeline. The RMS value of velocity fluctuations and their corresponding mean local velocities were measured by means of an electromagnetic flowmeter in three horizontal layers of the tube cross-section. Both increase and decrease of the turbulence intensity were observed for various values of the velocity, concentration, grain size and specific gravity of the rigid particles. As the particles move with rotation, it is possible to think of a particle as an 'eddy-generator'. This factor assists the growth of the eddies. These 'group-eddies' are generated near the bottom and by growing they are simultaneously exposed to the influence of lift force. The creating and growing of these eddies is broken by passing of particles across the eddy, by means of 'natural' turbulence, and by interaction with another eddy. When the intense eddy reaches the upper part of flow with an opposite sense of the velocity gradient, it comes to the influence of forces which are in general acting against the rotation of the whole eddy and of single particles. (Knapp-USGS)
W73-00549

CURRENT WITH TRANSPORT OF SOLIDS; THE DETERMINATION OF THE RELATIONSHIP BETWEEN ITS INTEGRAL PARAMETERS AND ITS POINT KINEMATIC CHARACTERISTICS (COURANT AVEC TRANSPORT SOLIDE: DETERMINATION DU RAPPORT ENTRE SES PARA METRES INTEGRAUX ET SES CARACTERISTIQUES CINEMATIQUES PONCTUELLES),
Moskovskii Inzhenerno-Stroitelnyi Institut (USSR).
A. P. Youfine, N. V. Daniltchenko, V. K. Tarassov, and I. V. Filimonova.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Vol I, p 55-62, 1972 (release date). 4 fig.

Descriptors: *Turbulent flow, *Sediment transport, Suspended load, Bed load, Saltation, Turbulence, Traction, Transfer, Non-uniform flow.

The kinematical structure of flow containing solids and the influence of solid particles upon turbulent characteristics of the flow are discussed. Integral parameters of the flow may be determined through its local characteristic by substituting a dynamical analog, a flow of homogeneous liquid with the same dynamic characteristics. On the basis of this suggested method, the relationship between the velocity field of the flows and its specific losses of energy may be established. In most practical cases, the flow is non-uniform through its cross-section. Therefore some characteristics (Karman Parameter, tangential stresses) for upper and lower parts of the flow differ in value and are determined separately. The practical value of this procedure is the establishment of a new engineering technique for turbulent flow transportation of dispersed material. (Knapp-USGS)
W73-00550

DECAY OF PEAK CONCENTRATION IN UNIFORM FLOW WITH FINITE DURATIONS OF INJECTION,
Howard Univ., Washington, D.C. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05B.
W73-00552

ON THE THEORY OF TURBULENT DISPERSION OF SOLUBLE MATTER IN THE FLOWS OF IRREGULAR CROSS-SECTION,
Technical Univ. of Istanbul (Turkey). Dept. of Hydraulic and Water Power.
For primary bibliographic entry see Field 05B.
W73-00553

HYDROLOGICAL PROCESS OF TRANSFER IN TURBULENT FLOW WITHOUT PRESSURE (HYDROMECANIQUE DES PROCESSUS DU TRANSFERT DANS LES FLOTS TURBULENTS SANS PRESSION),
Akademiya Nauk URSR, Kiev. Inst. of Hydromechanics.
I. K. Nikitine.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Vol I, p 93-100, 1972 (release date). 4 fig, 1 tab.

Descriptors: *Turbulent flow, *Alluvial channels, *Open channel flow, *Channel morphology, Roughness (Hydraulic).

On the basis of measurement of uniform turbulent structure at river beds, a generalized two-layer model of turbulent flow was formulated and semiempirical methods for calculating the resistance coefficient, mean velocities, and fluctuation characteristics are suggested for all regimes with appreciable hydraulic roughness. The turbulent transfer processes in open channel flow include river bed deformation, bed load transport, and suspended load transport. The incremental method is suggested for calculating sedimentation facilities, head sections of canals, and for the dividing of fractions of bed load by water intakes. (Knapp-USGS)
W73-00555

CALCULATIONS OF PASSIVE ADDITION SPREADING IN A TURBULENT FLOW,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Gidrotekhniki i Melioratsii, Kharkov (USSR).
E. V. Eremenko, V. E. Lysenko, and O. M. Spiner.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Vol I, p 101-107, 1972 (release date). 3 fig, 11 ref.

Descriptors: *Dispersion, *Turbulent flow, Mathematical studies, Turbulence, Diffusion, Open channel flow, Mixing, Path of pollutants.

Present methods for calculation of dispersion of a passive addition in a flow are based on assumed equality of the diffusion coefficients for three mutually perpendicular directions. Strictly speaking, this makes it impossible to calculate diffusion in real anisotropic currents. Existing solutions of the problem with variant diffusion coefficients along different directions are related to an unlimited current in three-dimensional space. To solve diffusion within a limited space in a rectangular channel, coefficients of diffusion are assumed to be constaut, and coordinate axes are assumed to coincide with main axes of the tensor of diffusion. The rate of the addition inflow into the watercourse is assumed to be equal to the average rate of the flow. (Knapp-USGS)
W73-00556

DISPERSIVE CHARACTERISTICS OF FREE SURFACE FLOW IN TERMS OF LAGRANGIAN DESCRIPTIONS,
Kyoto Univ. (Japan). Dept. of Civil Engineering.
Y. Iwasa, and H. Imamoto.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Vol I, p 109-118, 1972 (release date). 6 fig, 2 tab, 7 ref.

Descriptors: *Turbulence, *Dispersion, *Mathematical studies, Hydraulic models, Open channel flow, Turbulent flow, Reynolds number, Shear drag, Flow resistance.

The Eulerian properties of turbulence in free surface shear flow are discussed in terms of a universal function expressed with the flow depth, the shear velocity and the local mean velocity. The Eulerian description is then transformed into the Lagrangian description. Theoretical relationships obtained are compared to observations made in two experimental flumes. The turbulence properties of free surface shear flow may be expressed in terms of the universal function under the condition that the aspect ratio is larger than 10. (Knapp-USGS)
W73-00557

TURBULENCE CHARACTERISTICS OF OVERLAND FLOW,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
I. T. Kisisel, J. W. Delleur, and R. A. Rao.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Vol I, p 119-126, 1972 (release date). 6 fig, 9 ref.

Descriptors: *Overland flow, *Turbulent flow, Turbulence, Model studies, Hydraulic models, Roughness (Hydraulic), Rainfall-runoff relationships, Open channel flow.

The effects of rainfall and surface roughness on the turbulence characteristics of overland flow were investigated. The rainfall generator was capable of producing uniform rainfall intensities varying from 5 to 15 inches/hour. The rainfall was superimposed on a shallow two-dimensional open channel flow. A smooth and a rough boundary were used. The results of measurements of the turbulence intensities are given in detail. The wall similarity hypothesis is verified. For flows with rainfall the longitudinal turbulence intensity increases considerably towards the free surface and the wall similarity hypothesis is no longer followed. Close to the wall the vertical turbulence intensity with rainfall is of the order of 60% of the longitudinal intensity and the values of the longitudinal and vertical intensities approach each other close to the free surface. Energy spectra, the scales of turbulence, and the Reynolds stresses are briefly summarized. (Knapp-USGS)
W73-00558

MOMENTUM TRANSFER FROM A JET TO A VORTEX,
Universidad Nacional Autonoma de Mexico, Mexico City. Instituto de Ingenieria.
E. Levi.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 127-134, 1972 (release date). 4 fig, 2 ref.

Descriptors: *Vortices, *Jets, *Energy transfer, *Momentum transfer, Rotational flow, Turbulence, Turbulent flow.

Unlike wake vortices, vortices such as drain and inlet vortices, cyclones, and tornadoes cannot be explained as being friction effects. It is suggested that they are the result of an unstable process, which starts when an accelerated or decelerated jet contacts a body of stagnant fluid. At first a part of the momentum of the jet gives rise to the centripetal force working in the vortex; consequently a dimensionless number, containing both jet and vortex characteristic parameters, has to keep a constant value. The condition was in fact fulfilled by three different experimental vortices: those produced in a tank by jets issues from a vertical and from an oblique nozzle respectively, and a jet arising behind a rectangular orifice set across a laboratory channel. (Knapp-USGS)
W73-00559

TWO-LAYER DENSITY-STRATIFIED FLOW IN AN OPEN-CHANNEL BEND,
Iowa Univ., Iowa City, Inst. of Hydraulic Research.
E. O. Macagno, and C. V. Alonso.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 199-206, 1972 (release date). 4 fig, 11 ref.

Descriptors: *Stratified flow, *Open channel flow, *Mass transfer, *Momentum transfer, *Turbulence, Turbulent flow, Eddies, Stratification, Mixing, Saline water intrusion, Meanders.
Identifiers: Open-channel bends.

The interactions between curvilinear flow and density-stratification in an open-channel bend were studied experimentally in the case of two layers of different density entering the bend. Three different modes of flow and mass transfer were found. In the first, a relatively strong stratification dominates the flow pattern and produces reversal of the sense of the spiral flow. In the second, the stratification is modified by the spiraling flow, but the flow also suffers important changes in the process to the point that the original spiraling trend results in several compatible spirals. In the third, the spiraling flow dominates the stratification, which is changed to the point of being inverted. A simplified calculation is presented for the estimation of the inclination of the interface due to density and velocity differences. Although the experiments were performed at a rather small scale, the modes found respond to dynamic effects which are of a general nature, and should be basically reproduced at other scales. (Knapp-USGS)
W73-00567

RESEARCH INVESTIGATION OF TRANSFER PROCESS IN TWO-DIMENSIONAL STRATIFIED FLOW,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Moscow (USSR).
For primary bibliographic entry see Field 05B.
W73-00569

EXPERIMENTAL STUDIES OF THE PHENOMENA OF TRANSFER AT A JUNCTION OF TWO OPEN CHANNEL FLOWS WITH DIFFERENT DENSITIES AND TEMPERATURES (ETUDES EXPERIMENTALES DES PHENOMENES DE TRANSFERT A LA RENCONTRE DE DEUX ECOULEMENTS A SURFACE LIBRE DE DENSITE OU DE TEMPERATURE DIFFERENTE),
Laval Univ., Quebec. Faculty of Sciences.
J. L. Verrette, and M. Leclerc.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume 1, p 227-234, 1972 (release date). 10 fig, 9 ref.

Descriptors: *Mixing, *Open channel flow, *Heat transfer, Mass transfer, Momentum transfer, Water temperature, Stratified flow, Turbulent flow, Turbulence, Eddies, Vortices.

A model study involved 2 permanent open channel flows with rectangular section meeting at a given angle of incidence. The water in both channels is at different temperatures. The effect of density clearly appears in a difference in the elevation of channel beds. In a general way, the lateral flow (the colder one) slips under the main flow until it hits the opposite side of the channel. Then they mix together due to the impact. The efficiency of this impact is a function of geometry and veolcity. The underflow is then reflected from side to side until equilibrium is reached. Meanwhile turbulent mixing constantly occurs. The relationships between the angle of incidence, the main and lateral velocity of the difference of density are given. (Knapp-USGS)
W73-00570

SEDIMENTATION AND FLUIDIZATION OF BEDS OF GRANULAR MATERIALS AND PARTICLES IN THE WATER (SEDIMENTATION ET FLUIDISATION DES COUCHES DE MATERIAUX GRANULEUX ET DES FLOCONS DANS L'EAU),
Vysoka Skola Dopravni, Zilina (Czechoslovakia).
I. Tesarik.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 275-282, 1972 (release date). 3 fig, 12 ref.

Descriptors: *Jets, *Fluid mechanics, *Sedimentation, *Suspension, Flow, Hydraulics, Slurries.
Identifiers: *Fluidized beds.

Rising and sinking streams in fluidized beds can be caused by liquid jets at the entrance. Singularities of the geometry and of the diameter of the apparatus cause low stability of the flow in the fluidized bed. The phenomenon of homogeneous fluidization is not identical with the sedimentation of a concentrated layer of particles. (Knapp-USGS)
W73-00576

CONVECTIVE DIFFUSION IN CELLULAR LAMINAR FLOW IN TUBES,
Illinois Univ., Chicago.
G. Bugliarello.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 291-297, 1972 (release date). 5 fig, 7 ref.

Descriptors: *Heat transfer, *Laminar flow, *Boundary processes, Convection, Diffusion, Flow.
Identifiers: Cellular laminar flow.

The motion of a fluid trapped between piston-like solid boundaries (discs) moving in a tube can lead to enhancement of mass or heat transfer processes between cells and tube boundaries. The phenonmenon is described for the case of laminar flow. Conflicting requirements exist between the enhancement of the mass and heat transfer and the reduction of energy dissipation. For the case of a disc-liquid mixture (a mixture with a number of discs), other factors being equal the energy dissipation is reduced if the discs proceed in groups, rather than individually. (Knapp-USGS)
W73-00577

METHODS OF APPROACH FOR PROBLEMS OF MIXED CONVECTION IN FLUID METALS (METHODES D'APPROCHE POUR LES PROBLEMS DE CONVECTION MIXTE DANS LES METAUX LIQUIDES),
LNH-EDF, Chatou (France).
A. Daubert, and J. P. Huffenus.
In: Hydraulic research and its impact on the environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 299-308, 1972 (release date). 3 fig.

Descriptors: *Heat transfer, *Convection, *Mass transfer, *Hydraulic models, *Mathematical models, Cooling, Boundary processes.

Problems of mixed convection in which the phenomena of forced and free convection are intermingled with equal importance are difficult, since the momentum and heat (or mass) transfers cannot be dealt with separately. The problems are even more complex when they concern fluids with a low Prandtl (or Schmidt) number, such as liquid sodium used in fast neutron nuclear reactors. The main difficulties arising from the various possible approaches are studied by using a physical scale model or mathematical model. Two types of flow must be considered, depending upon whether there is natural convection caused by heat transfer along a wall (type 1) or not (type two). Detailed examination of possibilities show that generally, a physical model may only be considered for type 2 problems, even though this often leads to serious difficulties in practical realization. For those problems where natural convection along a wall is essential (type 1), the physical model is generally unsuitable and a mathematical model must be used although the physical model may serve to investigate certain limit conditions. Several examples are given to illustrate this theory. (Knapp-USGS)
W73-00578

SOME EXPERIMENTAL INVESTIGATIONS ON THE BEHAVIOUR OF AIR-WATER INTERFACE IN AN OPEN CHANNEL TURBULENT FLOW,
Genoa Univ. (Italy). Inst. of Hydraulics.
I. Becchi, and L. Rebaudengo Lando.
In: Hydraulic Research and its Impact on the Environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 357-363, 1972 (release date). 6 fig, 1 tab, 5 ref.

Descriptors: *Momentum transfer, *Air-water interfaces, Turbulent flow, Laminar flow, Winds, Waves (Water), Open channel flow, Hydraulic models.

An experimental method is presented for investigating the free surface behavior of a turbulent flow and turbulence transfer through the surface layer. Assuming kinematic continuity between the liquid surface and the air above it, and laminar conditions in the air, velocities are measured so that the value on the interface may be extrapolated. From a series of experimental data concerning the average local velocity on the free surface, the flow field in air is different from that inside the liquid turbulent current. The correlation between turbulent axial velocities in water and fluctuations induced through the free surface into the air above it, as well as the root mean square values for a limited frequency range suggest there may be a damping layer and confirm the hypothesis of kinematic continuity. (Knapp-USGS)
W73-00582

TRANSFER OF AIR BY THE RING JUMP OF WATER,
Vyzkumny Ustav Vodohospodarsky, Prague (Czechoslovakia).
K. Haindl.
In: Hydraulic Research and its Impact on the Environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 365-372, 1972 (release date). 6 fig, 3 ref.

Descriptors: *Mixing, *Air entrainment, *Hydraulic jump, *Stratified flow, *Pipe flow, Boundary processes, Aeration, Turbulent flow.
Identifiers: *Annular flow, *Ring hydraulic jump.

The annular flow of liquids in a pipe changes into homogeneous or mixed flow through the whole flow profile by ring jump, which entrains gas from the core of the annular flow into the pressure discharge downstream of it, and mixes the components. The quantity of entrained air depends on the energy of the annular flow and on the pressure in the core. The annular flow can be created by streaming around a circular plate or by the outflow from hollow-cone valves. (Knapp-USGS)
W73-00583

THE MECHANISM DESCRIBING OXYGEN TRANSFER FROM THE ATMOSPHERE TO DISCHARGE THROUGH HYDRAULIC STRUCTURES,
Ohio River Div. Labs., Cincinnati.
A. G. Holler.
In: Hydraulic Research and its Impact on the Environment; Proceedings of 14th Congress of International Association for Hydraulic Research, Paris, August 29-September 3, 1971, Volume I, p 373-382, 1972 (release date). 4 fig, 4 ref.

Descriptors: *Reaeration, *Air entrainment, *Mixing, Model studies, Hydraulic models, Hydraulics, Hydraulic structures, Dissolved oxygen, Water quality.

A theoretical and experimental study of the reaeration of oxygen-deficient water discharged through hydraulic structures is presented. The results are specific equations which define the amount of reaeration obtained in terms of hydraulic parameters for the structures studied. Slight structural or operational modifications to the hydraulic structures increase the amount of reaeration obtained. Essentially no cost is incurred for additional reaeration which generally results in increased water quality. (Knapp-USGS)
W73-00584

NUMERICAL METHOD FOR GROUNDWATER HYDRAULICS,
Environmental Protection Agency, Annapolis, Md. Water Quality Office.
For primary bibliographic entry see Field 02F.
W73-00593

8C. Hydraulic Machinery

PROPOSED DEEP GEOTHERMAL TEST WELL, GEOTHERMAL RESOURCES INVESTIGATIONS, IMPERIAL VALLEY, CALIFORNIA (FINAL ENVIRONMENTAL IMPACT STATEMENT).
Bureau of Reclamation, Boulder City, Nev. Region 3.
For primary bibliographic entry see Field 04B.
W73-00052

WAHKIAKUM COUNTY CONSOLIDATED DIKING DISTRICT NO. 1, FLOOD PROTECTION PROJECT, WAHKIAKUM COUNTY, WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Portland, Oreg.
For primary bibliographic entry see Field 08D.
W73-00059

HOT AIR RECIRCULATION BY AIR COOLERS,
Hudson Products Corp., Houston, Tex.
For primary bibliographic entry see Field 05G.

W73-00079

EXISTING AUTOMATION, CONTROL AND INTELLIGENCE SYSTEMS FOR METROPOLITAN WATER FACILITIES.
For primary bibliographic entry see Field 05D.
W73-00145

COMPUTER AND CONTROL EQUIPMENT.
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00146

METROPOLITAN WATER INTELLIGENCE SYSTEM, COMPLETION REPORT. PHASE I.
Colorado State Univ., Fort Collins. Dept. of Civil Engineering.
For primary bibliographic entry see Field 05D.
W73-00154

PROPOSED HAVASU INTAKE CHANNEL, HAVASU PUMPING PLANT, AND BUCKSKIN MOUNTAINS TUNNEL (DRAFT ENVIRONMENTAL STATEMENT).
Bureau of Reclamation, Boulder City, Nev. Region 3.

Available from the National Technical Information Service as PB-207 454-D, $3.00 in paper copy, $0.95 in microfiche. March 7, 1972. 33 p, 3 map, 3 photo.

Descriptors: *Arizona, *Environmental effects, *Water conveyance, *Pumping plants, Water intakes, Tunnels, Tunnel construction, Channels, Conveyance structures, Water distribution (Applied), Water importing, Pumps, Conduits, Engineering structures, Structures, Pumping, Intakes structures, Aesthetics, Water storage, Recreation, Wildlife habitats.
Identifiers: *Environmental Impact Statements, *Lake Havasu (Arizona), Pumping plant construction.

This construction project is located on the south shoreline of the Bill Williams arm of Lake Havasu in Arizona. These facilities will enable water to be pumped from the Colorado River at Lake Havasu to water deficient areas principally in Maricopa, Pinal, and Pima Counties, Arizona. The rapidly expanding Phoenix and Tucson areas will benefit from the project. Construction of the facilities will have a minimal effect on the environment of the construction site. The visual aesthetics of the immediate area will be altered during construction and partially restored upon completion of the project. The 10 acres of Sonoran desert land required for the pumping plant and the acreage for the access road will be the only permanent adverse effects to the biota in the area. There will be some turbidity during construction. The Buckskin tunnel route was selected over alternate locations considered in the past because of its desirability from an aesthetic, engineering, economic, and environmental standpoint. (Beardsley-Florida)
W73-00476

TREASURE ISLAND, MISSOURI (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Memphis, Tenn.

Available from the National Technical Information Service as PB207 576-D, $3.00 in paper copy, $0.95 in microfiche. March 1972. 8 p, 1 map, 5 tab.

Descriptors: *Missouri, *Pumping plants, *Environmental effects, *Flood control, Pumping, Drainage systems, Sumps, Dams, Reservoirs, Agriculture, Levees, Rainfall, Flow, Low flow, Culverts, Flood frequency, Land clearing, Wildlife habitats, Fisheries.
Identifiers: *Environmental Impact Statements, *Treasure Island (Mo).

The project involves construction of a 150-cubic-foot-per-second (c.f.s) pumping plant to augment a 25 c.f.s. pumping plant now serving the leveed area known as Treasure Island in Dunklin County, Missouri. The plant will reduce the level and frequency of flooding on approximately 2,000 acres of farmland. An existing system of box culverts provides outlets for interior rainfall during periods of low flows in nearby drainage ditches. During periods of extensive flow however, it is necessary to use the existing pumping plant to pond the water in an adjacent area. With the 25 c.f.s. plant damaging flooding occurs up to eleven times per year. The proposed pumping plant will reduce the average number of damaging floods from 3.5 per year to 0.7 per year and reduce the average acreage flooded from 960 to 455. The project will not result in adverse environmental effects. However, reduced flooding may encourage clearing of scarce timberland and thereby reduce existing wildlife habitats. The topography of the area makes dams and reservoirs impractical and the alternative of no action would continue periodic damages from flooding. (Nielsen-Florida)
W73-00500

8D. Soil Mechanics

SKIATOOK LAKE, HOMINY CREEK, OKLAHOMA (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Tulsa, Okla.

Available from the National Technical Information Service as PB-207 460-F, $3.00 in paper copy. March 10, 1972. 208 p, 12 plate, 1 map, 8 photo, 47 tab, 3 append.

Descriptors: *Oklahoma, *Water supply, *Environmental effects, *Flood protection, Dams, Stream stabilization, Streams, Stream flow, Floods, Spillways, Water quality control, Water storage, Water supply development, Recreation, Wildlife, Levees, Multi-purpose reservoirs, Reservoirs, Artificial lakes, Impoundments, Water resources development, Flooding, Water management (Applied).
Identifiers: *Environmental Impact Statements, *Skiatook Lake (Okla).

The Skiatook Lake project, located northwest of Tulsa, Oklahoma, consists of an earth dam creating a lake on Hominy Creek for flood control, water supply, water quality control, recreation and fish and wildlife management. The project also includes an uncontrolled abutment spillway and supporting facilities. The creation of the reservoir will affect stream flow, upset temporarily the stability of the ecosystem of the area, and result in losses of 10,540 acres of wildlife habitat and smaller amounts of grazing and farming land. Environmental impacts include prevention of flood damage, providing water supply of good quality and expansion of recreational activities. Structural alternatives include a dry lake, levees, upstream multiple purpose lakes and levees with upstream multipurpose lakes. Nonstructural alternatives encompass flood plain zoning and insurance, early warning, floodproofing, acquiring the flood plain in fee and acquiring the flood plain in easement. Comments from interested agencies are included. (Nielsen-Florida)
W73-00050

LANEPORT, NORTH FORK AND SOUTH FORK LAKES, SAN GABRIEL RIVER, TEXAS (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Fort Worth, Tex.

Available from the National Technical Information Service as PB-207 736-F, $3.00 in paper copy. February 27, 1972. 139 p, 6 map, 11 tab, 29 ref, 8 append.

Descriptors: *Texas, *Environmental effects, *Flood protection, *Water supply, Flood control, Dams, Earth dams, Rockfill dams, Reservoirs, Water quality control, Recreation facilities, Recreation, Habitats, Wildlife habitats, Turbidity, Fertility, Fisheries, Vegetation effects, Water resources development, Water supply development, Benefits, Costs, Feasibility, Dam construction.
Identifiers: *Environmental Impact Statements, *San Gabriel River (Tex).

The San Gabriel River project involves the construction of Laneport, North Fork, and South Fork Lakes as units in the 12 reservoir Brazos River Basin System. The project will contribute toward satisfying flood protection, water supply, and water based recreation needs. Water in Laneport Lake should be of good quality, but turbid and nutrient rich due to cropland drainage. However, the water will be suitable for municipal and industrial use, and should improve the fisheries habitat. Shoreline erosion will be a problem since the lake is located in a broad, sloping valley. Water in the other lakes should be of good quality for public uses, but will rate only fair as a fishery resource due to the low fertility level and deep, clean water. The project's multi-withdrawal system will benefit fisheries by releasing good quality water. There will be a loss of wildlife and waterfowl habitat, however, the impact should be temporary in nature. Approximately 28 miles of stream habitat within the lakes will be lost by inundation. Vegetation loss will occur downstream due to land use changes. Both structural and non-structural alternatives were examined. (Ellis-Florida)
W73-00051

LAWRENCE, KANSAS, FLOOD PROTECTION PROJECT, KANSAS RIVER, KANSAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Kansas City, Mo.

Available from the National Technical Information Service as PB-206 390-D, $3.00 in paper copy. January 1972. 25 p, 1 map, 2 tab.

Descriptors: *Kansas, *Channel improvement, *Flood protection, *Environmental effects, Aesthetics, Turbidity, Flood control, Dredging, Channeling, Drainage, Levees, Wildlife habitats, Fish conservation, Riparian land, Surface drainage, River training, Natural streams.
Identifiers: *Environmental Impact Statements, *Lawrence (Kan).

The Lawrence, Kansas flood protection project consists of three units: North Lawrence levee, South Lawrence levee, and Mud Creek channel and levee. The first unit is nearing completion and the other two are in design and pre-construction phases. Approximately 7,500 acres would be protected by the North Lawrence and Mud Creek units. Channel improvement will be undertaken on Mud Creek and a 10 foot high levee will be constructed. The South Lawrence unit would provide protection for approximately 250 acres. Environmental impacts of the project include increased flood protection for 7,500 acres of Lawrence and surrounding agricultural areas, destruction of 4.7 miles of natural stream environment including fish and riparian wildlife habitats, increased incentives to urban development, temporary adversities from construction, and loss of recreational use of Mud Creek. Adverse impacts would include the degradation of the associated fish and wildlife habitat from channel improvement and consequent increased urban development and the temporary dust, noise, and erosion. Alternatives include no action, variation in levee and channel length and size, flood plain zoning, and flood plain evacuation. (Grant-Florida)
W73-00058

WAHKIAKUM COUNTY CONSOLIDATED DIKING DISTRICT NO. 1, FLOOD PROTECTION PROJECT, WAHKIAKUM COUNTY, WASHINGTON (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Portland, Oreg.

Available from the National Technical Information Service as PB-206 389-D, $3.00 in paper copy. January 1972. 22 p, 1 map, 1 photo.

Descriptors: *Washington, *Columbia River, *Levees, *Environmental effects, Flood protection, Flood control, Pumping plants, Landfills, Borrow pits, Wildlife habitats, Waterfowl, Ducks (Wild), Turbidity, Aesthetics, Dredging, Excavation.
Identifiers: *Environmental Impact Statements, *Wahkiakum County (Wash).

The proposed action involves construction of various improvements in the existing levee system on Puget and Little Islands in the Columbia River, Washington. The work is designed to correct various deficiencies and includes: replace three existing pumping stations and increase capacity by 41,500 GPM; removal and replacement of existing tide boxes; raising the levee to a proposed high of 12.7 feet downstream and 14.0 at the upstream end for a total of 11 miles; and filling existing borrow ditches. About 650,000 cubic yards of material will be dredged from the river for the raising and filling operation. Environmental impacts include less frequent flooding in the diking district; elimination of stagnant water areas; elimination of nesting habitat for ducks and cover for pheasants, furbearers and small birds; increased insect damage to crops from loss of birds; and short-term unpleasantries during construction. Adverse impacts include the loss of habitat for animals due to filling the borrow ditches and the temporary turbidity, noise, and dust during construction. Alternatives include no action, pursuing only a single flood prevention measure, and locating the levee in a different place. (Grant-Florida)
W73-00059

GEOLOGICAL, GEOPHYSICAL, AND ENGINEERING INVESTIGATIONS OF THE LOVELAND BASIN LANDSLIDE, CLEAR CREEK COUNTY, COLORADO, 1963-65,
Geological Survey, Washington, D.C.
C. S. Robinson, F. T. Lee, R. W. Moore, R. D. Carroll, and J. H. Scott.
Available from GPO, Washington, DC 20402 Price $0.75 (Paper cover). Geological Survey Professional Paper 673-A,B,C,D,E,F,G, 1972. 43 p, 24 fig, 16 ref.

Descriptors: *Landslides, *Engineering geology, *Field investigations, *Colorado, *Documentation, Engineering structures, Data collections, Geomorphology, Geological surveys, Tunneling, Drilling, Drainage, Groundwater movement.
Identifiers: *Loveland Basin landslide (Colorado), *Geophysical investigations.

The Loveland Basin, Colorado, landslide that occurred in the Spring of 1963 was caused by an excavation made for the approach road to the east portal of the Straight Creek Tunnel. The site of the tunnel is about 55 miles west of Denver on the north side of Loveland Basin and northwest of the Loveland Basin ski area. Joint conferences of the Colorado Department of Highways, the U.S. Bureau of Public Roads, and U.S. Geological Survey resulted in decisions to map the landslide geologically and to try to determine the thickness of the slide and other data by geophysical methods. The methods used to investigate the landslide during the period of June 1963 through June 1965 and the results of those investigations are described. The work is presented in seven topical chapters; each chapter was written by those persons principally responsible for the work. (See also W73-00207) (Woodard-USGS).
W73-00206

ENGINEERING INVESTIGATIONS,
Colorado State Dept. of Highways.
J. D. Post, and C. S. Robinson.
Geological Survey Professional Paper 673-D, 1972. In: Geological, Geophysical and Engineering Investigations of the Loveland Basin Landslide, Clear Creek County, Colorado, 1963-1965, p 21-26. 3 fig, 2 tab.

Descriptors: *Landslides, *Drainage engineering, *Groundwater, *Surface waters, *Colorado, Drilling, Methodology, Precipitation (Atmospheric), Snow, Melt water, Geologic investigations, Seepage, Infiltration.
Identifiers: *Loveland Basin landslide (Colorado), *Landslide drainage, Horizontal drilling.

After recognition of the Loveland Basin landslide on June 28, 1963, the Colorado Department of Highways established control points around and on the landslide mass in order to observe the amount and rate of movement. To drain surface and groundwater from the landslide, five near-horizontal holes were drilled in the west margin of the slide. The water from two springs was collected and piped off the slide, and an 18-inch pipe was placed in an area of unusually heavy snow accumulation to conduct the melt water from the landslide. Most of the precipitation on the landslide is snow, which accumulates to depths of as much as 250 inches. When the snow melts, very little of this moisture runs off the landslide; most of it melts from below and seeps into the landslide mass or evaporates. (See also W73-00206) (Woodard-USGS)
W73-00207

FROST HEAVING OF PILES IN PERMAFROST,
Wyller-Kollewich-Van Doren and Hazard, Anchorage, Alaska; and Raymond International, Inc., Anchorage, Alaska.
J. Allen, and R. W. Huck.
Civil Engineering, Vol 42, No 4, p 77-79, April 1972. 4 fig, 2 tab.

Descriptors: *Piles (Foundations), *Frost heaving, Permafrost, Frost, Construction methods, Frost protection, Cold weather construction, Heaving, Shear strength, Frost action, Foundations, Alaska, Soil mechanics, Soils, Design, Frozen soils.
Identifiers: Frost resistance, Vertical displacements, Thermal balance, Differential displacements, *Pile foundations, Pile friction, Ice lenses, Pile spacing, Skin friction.

Frost formation in the soil around piles can cause destructive differential settlements. In some permafrost areas, soil zones encountered from the surface to increasing depths are: (1) seasonally frozen ground (active zone); (2) unfrozen ground; and (3) perenially frozen ground. Three basic requirements causing ice lenses and heaving forces to develop in the active zone are: (1) a supply of free water, (2) a soil temperature below 32 deg F, and (3) a frost-susceptible soil. The heaving force transmitted to a pile is proportional to the shearing resistance developed at the soil-pile interface. Greater shearing resistances develop for lower soil temperatures and rougher pile surfaces. To assure realistic pile designs, heave forces of the active zone and the resisting shear forces in the perennially frozen zone should be calculated. Pile placement methods include vibrating, augering, or thawing; in all instances, the thermal energy balance should be considered. Suggested solutions are given for piles that do not enter perennially frozen ground. (USBR)
W73-00323

NEW HOPE LAKE, HAW RIVER, NORTH CAROLINA (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Wilmington, N.C.

Available from the National Technical Information Service as PB-198 999-D, $3.00 in paper copy, $0.95 in microfiche. April 21, 1971. 19 p.

Descriptors: *North Carolina, *Environmental effects, *Dam construction, *Impoundments, Project planning, Multiple-purpose projects, Intake structures, Spillways, Flood protection, Water supply, Water quality control, Water resources development, Recreation, Recreation demand, Turbidity, Flooding, Stream fisheries, Wildlife habitat, Land use.
Identifiers: *Environmental Impact Statements, *New Hope Lake,9n.c.0.

New Hope Lake, located on Haw River, North Carolina, is a multipurpose project involving construction of an earth dam to impound the lake water, a multilevel intake structure, an ungated spillway, and five separate subimpoundments. The dam will be 1,300 feet long and 112 feet high. Twenty-eight sites will be developed as public-use and service areas to provide a variety of recreational opportunities. The project will provide flood protection, water supply, water quality control, and recreation benefits. The project will create a vastly increased warm-water fishery in the lake. The lake storage will help reduce turbidity and will help maintain water quality. Adverse effects include the inundation of about 22 miles of free-flowing stream, field, farmland, and forests, some of which represent wildlife habitat. Temporary increases in downstream turbidity will be experienced during construction. Alternatives include a dry dam for flood protection only, small dams on tributaries, flood-plain zoning, alternate sites for the main-stem reservoir, and abandonment of the project. (Widman-Florida)
W73-00488

MUD MOUNTAIN DAM AND RESERVOIR, WHITE RIVER, WASHINGTON (FINAL ENVIRONMENTAL STATEMENT).
Army Engineer District, Seattle, Wash.

Available from the National Technical Information Service as PB200 931-F, $3.00 in paper copy, $0.95 in microfiche. April 20, 1972. 47 p, 2 plate.

Descriptors: *Washington, *Environmental effects, *Dam construction, *Reservoir construction, Flood protection, Flood control, Flood routing, Dams, Reservoirs, Flood plains, Water control, Sediment discharge, Engineering structures, Rockfill dams, Levees, Fisheries, Fish passage, Earth dams, Rockfill dams, Tunnels, Turbidity, Food chains.
Identifiers: *Environmental Impact Statements, *White River (Wash), *Mud Mountain Dam.

The project is located on the White River between King and Pierce Counties in Washington. The dam is an earth-core and rockfill structure 700 feet long and 425 feet high which provides 106,000 acre feet of floodstorage. Flood protection for several farms, towns, and industries in the flood plain is provided by the dam in conjunction with channel improvements and a levee system. Upstream salmon and anadromous trout runs are blocked by the dam, but fish passage facilities are provided. The project takes land out of timber and wildlife production because up to 1200 acres are periodically inundated. The release of accumulated sediment from the reservoir during maintenance can result in non-compliance with water quality standards controlling stream turbidity and can have an adverse effect on food organisms and eggs in gravel. Injury to juvenile fish using the stream for a nursery area also results. Alternatives under study are the construction of a settling basin for silt and bed load and conversion of the project to a multipurpose facility. An abrasion resistent steel tunnel lining is being considered for the elimination of periodic closures of the tunnel and reduction of turbulence downstream. (Beardsley-Florida)
W73-00502

ALPINE LAKE PROJECT, ALPINE, TEXAS (DRAFT ENVIRONMENTAL IMPACT STATEMENT).
Army Engineer District, Albuquerque, New Mex.

Available from the National Technical Information Service as PB207 078-D, $3.00 in paper copy, $0.95 in microfiche. January 25, 1972. 22 p, 3 tab, 1 append.

Descriptors: *Environmental effects, *Multiple-purpose projects, *Texas, *Reservoir construction, *Flood control, Water storage, Dams, Water sports, Industrial water, Reservoirs, Reservoir storage, Flood plains, Flood protection, Watersheds (Basins), Vegetation effects, Sediment load, Sediment control, Recreation, Water supply, Wildlife habitats.
Identifiers: *Environmental Impact Statements, *Alpine Lake Project (Tex), Alpine (Tex).

Alpine, Texas, is located in the semi-arid southwestern area of the state. The nature of the area is such that present enjoyment of water resources for recreational and water supply purposes is limited. Adequate flood control is also not possible. The recommended plan of improvement provides for the construction of a reservoir for municipal and industrial water supply storage. Total reservoir capacity would be 12,710 acre-feet with 5,100 acre-feet allocated to municipal and industrial water supply storage, and 4,530 acre-feet allocated to flood control storage. Further allocations for sediment detention and recreational uses would be created by the proposed project. The reservoir would be created by construction of an earthfill dam, diversion channels, gated outlet works from the dam, and a spillway. Beneficial environmental impacts include aesthetic improvements, flood control protection, and recreational use. Adverse impacts include permanent loss of 740 acres of natural habitat, through inundation; loss of natural vegetation caused by construction vehicles; and littering problems during periods of high public recreational use. Alternative solutions include foregoing construction, improvement of existing river channels, and diversion measures. Alternative solutions, however, would not satisfy the multiple water resource needs of the area. (Bradley-Florida)
W73-00510

8E. Rock Mechanics and Geology

THE CONTROLLED FAILURE OF ROCK DISCS AND RINGS LOADED IN DIAMETRAL COMPRESSION,
Minnesota Univ., Minneapolis; James Cook Univ. of North Queensland, Townsville (Australia); and Bochum Univ. (West Germany).
J. A. Hudson, E. T. Brown, and F. Rummel.
International Journal of Rock Mechanics and Mining Science, Vol 9, No 2, p 241-248, Mar 1972. 10 fig, 18 ref.

Descriptors: *Tensile strength, *Rock mechanics, Laboratory tests, Compression tests, Rock properties, Failure, Granite, Limestone, Marble, Cracks, Rocks, Stress analysis, Tension tests, Bibliographies.
Identifiers: *Brazilian test, *Ring compression theory, *Rock tests, West Germany, Control equipment, Rings, Stiffness, Servomechanisms, Tensile properties.

The diametral compression of disks (the Brazilian test) and of rings induces a zone of tensile stress in specimens. If failure occurs in the tensile zone with increased load, then these tests can be regarded as indirect methods of measuring the tensile strength. Control of specimen failure, from initial loading to final zero load-bearing capability, was achieved with a closed-loop, servocontrolled testing machine. To determine whether failure initiated in the zone of tensile stress, granite, Solenhofen limestone, and Tennessee marble specimens were unloaded just after the peak of the force-lateral displacement curves and visually examined for damage. In the Brazilian test, failure always initiated directly under the loading points if flat steel platens only were used to load the specimens. For ring tests with a small hole, failure initiated at the loading points for flat steel platen loading, and at the boundary of the hole on the loaded diameter when a load distributing device was employed. Neither the Brazilian test nor the ring test is recommended for measuring the material property tensile strength. Variation in tensile strength for different laboratory tests may indicate that the maximum tensile stress is not a material property. (USBR)
W73-00320

MICROEARTHQUAKES AT THE GEYSERS GEOTHERMAL AREA, CALIFORNIA,
Geological Survey, Menlo Park, Calif.
For primary bibliographic entry see Field 02F.
W73-00326

8F. Concrete

COMPUTERIZED CONCRETE CONTROL AT LARGE PROJECTS,
Bureau of Reclamation, Denver, Colo.
E. L. Ore, and J. D. Richards.
Paper, 1972 Annual American Concrete Institute Convention, Dallas, Texas, March 1972. 14 p, 6 fig.

Descriptors: *Concrete control, *Concrete construction, *Concrete mixes, Construction methods, Construction control, Concrete plants, Concrete technology, Concrete dams, Design practices, Computer programs.
Identifiers: *Time sharing, *Calculations, Time saving, Pueblo Dam (Colo), Iteration method, Batching, Computer applications, Gradation, Field control.

The time-consuming task of concrete control for a large dam can be greatly improved by using time-sharing computers. Usually, a series of established mixes is used throughout the job; however, changing aggregate moistures and gradations require frequent adjustment of scale weights to achieve concrete uniformity. Test batches are taken, yield quantities are calculated, and detailed records kept. Several hours each day are spent performing and checking these iterative calculations. By using a teletype located at the mixing plant or in the project laboratory, a large computer can be instructed to make these routine calculations. More exact control is achieved, and moisture, gradation, and scale weights can be calculated in a fraction of the time presently required. The average batch plant technician can be taught to use the technique in a few hours. Records of scale weights and yield quantities can be stored in the computer and recalled at any time. The practicality of using a computer for concrete control has been demonstrated at a Bureau of Reclamation project. (USBR)
W73-00322

8G. Materials

BIOLOGICAL INCRUSTATION OF WELLS DUE TO MASS DEVELOPMENT OF IRON AND MANGANESE BACTERIA,
Bundesgesundheitsamt, Berlin (West Germany). Institut fuer Wasser-, Boden-, und Lufthygiene.
For primary bibliographic entry see Field 05G.
W73-00008

8H. Rapid Excavation

CORPS OF ENGINEERS FINDS THAT LARGE EXPLOSIONS YIELD LOW COST IN ROCK EXCAVATING,
Army Nuclear Cratering Group, Livermore, Calif.
R. S. Holmes.
Mining Engineering, Vol 24, No 4, p 36-39, Apr 1972. 4 fig, 5 photo.

Descriptors: *Rock excavation, Excavation, Costs, High explosives, Harbors, Construction methods, Construction, Channels, Sandstones.
Identifiers: *Explosive excavation, Cratering, Rapid excavation, Detonation, Spacing, Prosplit blasting, Blasting, Clay shales, Slurry explosives, Tugboat project, Trinidad project, Fort Peck Dam (Mont), Cylindrical charges, Spherical charges, Prosplitting.

During 1962-69, the U S Corps of Engineers executed many cratering explosions to model nuclear excavation concepts and to develop design criteria for cratering explosions. In 1969, the research was broadened to include chemical explosive excavation as a construction tool. Present emphasis involves up to hundreds of tons of ANFO or aluminized ANFO slurry explosives to combine controlled blasting with explosive excavation. This technology is competitive with conventional methods of excavation in many applications. In 1969, the first project connected Fort Peck Reservoir to a row crater 1000 ft long and 100-200 ft wide. Project Tugboat produced an entrance channel and berthing basin for small craft in Hawaii. Project Trinidad explosively excavated a railroad cut. Test series at this site investigated methods of emplacement construction; compared explosives; investigated charge spacings, cratering efficiency, and seismic and airblast signals for sequential and simultaneous detonations; and collected information on single- and double-row excavations on side hills. Controlled blasting is a sound investment. Excavation cost is sensitive to size and location of project, rock properties, fragmentation requirements, and haul distances. (USBR)
W73-00329

8I. Fisheries Engineering

AGRICULTURAL AND AQUACULTURAL USES OF WASTE HEAT,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 05G.
W73-00069

WEIGHT LOSS OF POND-RAISED CHANNEL CATFISH (ICTALURUS PUNCTATUS) DURING HOLDING IN PROCESSING PLANT VATS,
National Marine Fisheries Service, Rohwer, Ark.
D. C. Greenland, and R. L. Gill.
NOAA (Natl Ocean Atmos Admin) Tech Rep Nmfs (Natl Mar Fish Serv) S.S.R.F. (Spec Sci Rep Fish). 648. 1-7. 1971. Illus.
Identifiers: *Catfish, Channel catfish, Ictalurus-Punctatus, Ponds, Vats, *Weight loss, *Arkansas.

Information on weight loss and mortality was obtained for samples of I. punctatus held for processing at a catfish processing plant located at Dumas, Arkansas. Weight losses were determined for several different holding situations by daily weighings of samples held in wire containers. Mortality was recorded at 24-hr intervals. Test results showed peak weight loss during the test period for all holding situations averaged 55 kg/metric ton (5.5 lb/cwt), 82.0% of which occurred during the first 48 hr of holding. There was no difference in weight loss of fish held at densities of 320.3 kg/m3 (20.0 lb/ft) and 640.6 kg/m3 (40.0 lb/ft3) of water ranging from 21.1 degrees to 22.2 degrees C (70.0 degrees to 72.0 degrees F). However, at the heavier loading there was twice the mortality, 8% com-

pared to 4.5%. Fish held in a pond with temperatures from 8.9 degrees to 15 degrees C (48 degrees to 59 degrees F) fared the best of any of the test groups. These fish had a peak weight loss of 2% and suffered no mortality. Similar groups of fish held in vats at 21.1 degrees C (71 degrees F) aerated with agitators and compressed air had peak weight losses of 4.2% and 6.9% and suffered mortalities of 34% and 15%, respectively.--Copyright 1972, Biological Abstracts, Inc.
W73-00615

INTERACTIONS OF STOCKING DENSITY AND WATER TURNOVER ON GROWTH AND FOOD CONVERSION OF CHANNEL CATFISH REARED IN INTENSIVELY STOCKED TANKS,
J. W. Andrews, L. H. Knight, J. W. Page, Y. Matsuda, and E. E. Brown.
Prog Fish-Cult. Vol 33, No 4, p 197-203. 1971. Illus.
Identifiers: Catfish, *Channel catfish, Ictalurus-Punctatus, Fish tanks, *Fish management, Fish growth, *Stocking density (Fish).

In an attempt to gain information on the water and stocking density requirements for high density culture (tank or raceway) of channel catfish (Ictalurus punctatus), fingerlings averaging 20 g each were reared for 6 mo. in 18, 8-ft diameter fiberglass fish culture tanks. A duplicated 3 x 3 factorial design with 3 stocking rates (2, 4, and 6 fish/ft3 of water) and 3 water exchange rates (2.5, 6, and 12 hr/turnover) was utilized. In the groups with the best conditions, fish were reared to an average weight of 343 g. Stocking density and water turnover both had substantial effects on growth and food conversion. Reduced growth due to an increase in stocking density was largely compensated for by increased water exchange. The fact that excellent performance (high growth and survival rate and low food conversion) was obtained in relatively poor environmental conditions (compared to trout or salmon requirements) indicated that catfish may be ideal for high density culture in tanks or raceways.--Copyright 1972, Biological Abstracts, Inc.
W73-00626

THE INFLUENCE OF PHOTOPERIOD ON GROWTH AND FOOD CONVERSION OF CHANNEL CATFISH,
Skidaway Inst. of Oceanography, Savannah, Ga.
R. R. Stickney.
Prog Fish-Cult. Vol 33, No 4, p 204-205. 1971.
Identifiers: *Aquariums, Catfish, *Channel catfish, Food conversion, Growth, Ictalurus-Punctatus, *Photoperiod.

Two experiments were carried out in aquariums to test the effect of photoperiod on growth of channel catfish (Ictalurus punctatus) fingerlings averaging 5.5 and 23 g. The fish were exposed to photoperiods of 0, 6, 12, 18, and 24 hr for several weeks. In both experiments a more rapid growth rate was noted with a 12-hr photoperiod, although differences among the groups were not statistically significant. Food conversion ratios were slightly improved at 12 hr photoperiod. These results indicate that controlled photoperiod has little effect on the production of catfish.--Copyright 1972, Biological Abstracts, Inc.
W73-00627

FISHING OF LAKE ARTHROPODA INTO LIGHT TRAPS,
Wyzsza Szkola Rolnicza, Szczecin (Poland). Dept. of Hydrozoology.
L. Szlauer.
Pol Arch Hydrobiol. Vol 18, No 1: p 81-91. 1971.
Identifiers: *Arthropoda, *Trapping, Cladocera, Copepoda, *Fishing, Lakes, Traps.

Water Arthropoda were caught into 18 lm (lumen) and 1000 lm light traps in the Insko Lake (Northwestern Poland). Drafts into 1000 lm trap reached 90 ml of volume and approached a million individuals during 3 hr. Better results were obtained before than after 10 pm. Increase of the brightness of light caused great increase in the amount of light-trapped Cladocera, and small increase of Copepoda. Particular species differed largely in their attraction to light, which also depended on the zone of draft.--Copyright 1972, Biological Abstracts, Inc.
W73-00644

09. MANPOWER, GRANTS AND FACILITIES

9A. Education (Extramural)

EIGHTH ANNUAL REPORT WATER RESOURCES RESEARCH CENTER.
Minnesota Univ., Minneapolis. Water Resources Research Center.
For primary bibliographic entry see Field 09D.
W73-00263

9D. Grants, Contracts, and Research Act Allotments

EIGHTH ANNUAL REPORT WATER RESOURCES RESEARCH CENTER.
Minnesota Univ., Minneapolis. Water Resources Research Center.

Available from the National Technical Information Service as PB-212 581, $3.00 in paper copy, $0.95 in microfiche. Bulletin 54, August 1972. 109 p. OWRR A-999-MINN (26). 14-31-0001-3523.

Descriptors: *Water resources, *Minnesota, Education, *Projects, Expenditures, Manpower, Water pollution, Water resources research act, *Water resources institute.
Identifiers: *Applied research, *Basic research, Physical-biological-economic-social aspects, Faculty.

The fiscal year 1972 budget of the Center was $449,704. The Center supported 20 research projects involving 21 faculty members. These research projects were concerned with: water resources administration, zooplankton biomass in Lake Superior, mathematical watershed system analysis, aquatic plants, eutrophic lakes, groundwater basin information, mist irrigation, watershed runoff, soil water movement, nearshore periphyton, environmental movement, Mississippi River ecology, perception of water resources problems, financing of water resources development, water pollution social factors, water resources attitudes, forest management, water resources policies, subsurface irrigation, and flood forecasting. About 67 students received employment through the Center's program. During fiscal year 1972, there were 25 reports generated through research projects.
W73-00263

10. SCIENTIFIC AND TECHNICAL INFORMATION

10F. Preparation of Reviews

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Department of the Environment, Ottawa (Ontario).
For primary bibliographic entry see Field 05G.
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For primary bibliographic entry see Field 05C.
W73-00386

EFFECTS ON SURFACE WATERS,
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For primary bibliographic entry see Field 05C.
W73-00387

OXYGEN SAG AND STREAM SELF-PURIFICATION,
Flood and Associates, Inc., Jacksonville, Fla.
For primary bibliographic entry see Field 05C.
W73-00388

INFLUENCE OF AQUATIC SEDIMENTS ON WATER QUALITY,
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 05C.
W73-00389

EFFECTS ON GROUNDWATER,
Hawaii Univ., Honolulu.
For primary bibliographic entry see Field 05B.
W73-00390

THE BDELLOVIBRIOS,
California Univ., Davis. Dept. of Bacteriology.
For primary bibliographic entry see Field 05A.
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CENTRE D'OCEANOGRAPHIE, MARSEILLE (FRANCE). STATION MARINE D'ENDOUME.
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CENTRE FOR ADVANCED STUDY IN MARINE BIOLOGY, PORTO NOVA (INDIA).
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Tables of Water Content-Density Relations for Saturated Soils,
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COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANIZATION, NORTH RYDE (AUSTRALIA). DIV. OF FOOD RESEARCH.
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COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, KUMASI (GHANA). BUILDING AND ROAD RESEARCH INST.
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A Low Temperature Cleanup Procedure for Pesticides and Their Metabolites in Biological Samples,
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DEPARTMENT OF STATE, WASHINGTON, D. C.
Documents for the U.N. Conference on the Human Environment, Stockholm, June 5-16, 1972--Part 1.
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Documents for the U.N. Conference on Human Environment, Stockholm, June 5-16, 1972--Part II.
W73-00466 6E

DEPARTMENT OF THE ENVIRONMENT (ALBERTA). INLAND WATERS BRANCH.
Hydrogeochemistry of the Surface Waters of the Mackenzie River Drainage Basin, Canada--I. Factors Controlling Inorganic Composition,
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DEPARTMENT OF THE ENVIRONMENT (ALBERTA). WATER RESOURCES DIV.
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DEPARTMENT OF THE ENVIRONMENT, OTTAWA (ONTARIO).
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DEPARTMENT OF THE ENVIRONMENT, OTTAWA (ONTARIO). POLICY PLANNING AND RESEARCH SERVICE.
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North Carolina Marine Algae. I. Three New Species from the Continental Shelf,
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Effects of Warm Water Effluents from Power Stations on Marine Life,
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Parametric Cost Studies of the Multistage Flash Process,
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Comparative Study of the Effect of C-14 Labeled Glucose and C-14 Labeled Straw on the Structural Stability of an Acidic Muddy Soil,
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W73-00056 5D

ENVIRONMENTAL PROTECTION AGENCY, PHILADELPHIA, PA. REGION III; AND PENNSYLVANIA DEPT. OF ENVIRONMENTAL RESOURCES, HARRISBURG.
Water Quality Standards Summary for Interstate Waters in the Commonwealth of Pennsylvania.
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ENVIRONMENTAL PROTECTION AGENCY, RALEIGH, N. C. DIV. OF METEOROLOGY.
Study of Effluents from Large Power Plants,
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ENVIRONMENTAL PROTECTION AGENCY, SAN FRANCISCO, CALIF.
Ocean Outfall Extension Project (WPC-CAL-468), Carmel Sanitary District, Carmel, California (Final Environmental Impact Statement).
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ENVIRONMENTAL PROTECTION AGENCY, SEATTLE, WASH. REGION X.
Proposed Sewage Facilities, Richland, Washington (Draft Environmental Impact Statement).
W73-00044 5D

ENVIRONMENTAL PROTECTION AGENCY, SPRINGFIELD, ILL.
Water Quality Network, 1971 Summary of Data, Volume 1, All Illinois Basins Except Lake Michigan Basin, Sanitary and Ship Canal Basin, and Des Plaines River Basin.
W73-00458 5A

Water Quality Network, 1971 Summary of Data, Volume 2, Lake Michigan Basin, Sanitary and Ship Canal Basin, and Des Plaines River Basin.
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Combining Optimization With Surface-Water Flow,
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An Investigation Into the Effects of Chlorinated Solvents on Sludge Digestion,
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FISHERIES RESEARCH BOARD OF CANADA ST. ANDREWS (NEW BRUNSWICK). BIOLOGICAL STATION.
The Influence of Synthetic Surfactants on the Functional Properties of the Olfactory Epithelium of Atlantic Salmon,
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FISHERIES RESEARCH BOARD OF CANADA, ST. JOHN'S (NEWFOUNDLAND). BIOLOGICAL STATION.
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FISHERIES RESEARCH BOARD OF CANADA, WINNIPEG (MANITOBA). FRESHWATER INST.
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Factors Affecting the Use of a Nondispersive System for Atomic Fluorescence Flame Spectrometry,
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FLORIDA STATE UNIV., TALLAHASSEE. DEPT. OF OCEANOGRAPHY.
Silica Contents in the Northwestern Florida Gulf Coast,
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Interbasin Transfers: Nebraska Law and Legend,
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FLORIDA UNIV., GAINESVILLE. DEPT. OF PLANT PATHOLOGY.
Aphanomyces Blight of Amazon Sword Plants,
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FLORIDA UNIV., GAINESVILLE. DEPT. OF ZOOLOGY.
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FOOD AND DRUG ADMINISTRATION, BROOKLYN, N.Y.
Collaborative Study of the Determination of Iron and Aluminum in Baking Powder by Atomic Absorption Spectrophotometry,
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FOOD AND DRUG ADMINISTRATION, WASHINGTON, D.C.
Determination of Lead in Fish by Atomic Absorption Spectrophotometry and by Polarography. I. Development of the Methods,
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GENEVA UNIV. (SWITZERLAND). DEPT. OF MINERAL AND ANALYTICAL CHEMISTRY TRAINING.
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GEOLOGICAL SURVEY, AUSTIN, TEX.
Hydrologic Studies of Small Watersheds, Calaveras Creek, San Antonio River Basin, Texas, 1955-68,
W73-00205 4A

GEOLOGICAL SURVEY, LAKEWOOD, COLO.
Radiochemical Monitoring of Water After the Cannikin Event, Amchitka Island, Alaska, January 13-April 5, 1972,
W73-00587 5B

GEOLOGICAL SURVEY, MENLO PARK, CALIF.
Selected Physical and Chemical Characteristics of 20 California Lakes,
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Microearthquakes at the Geysers Geothermal Area, California,
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Impact of Drought on New Jersey's Water Resources,
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GEOLOGICAL SURVEY, WASHINGTON, D.C.
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Geological, Geophysical, and Engineering Investigations of the Loveland Basin Landslide, Clear Creek County, Colorado, 1963-65,
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GEOLOGICAL SURVEY, YAKUTSK (USSR).
Principles of Geomorphological Map Construction for Gold Placer Exploration (Based on Yakutsk Region Examples),
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GEORGIA UNIV., ATHENS. INST. OF ECOLOGY.
Scanning Electron Microscopy of Microbial Cells on Membrane Filters,
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GHANA UNIV., LEGON. VOLTA BASIN RESEARCH PROJECT.
Ecology of Phytoplankton of the Volta Lake,
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GOETTINGEN UNIV. (WEST GERMANY). INST. FOR PLANT PHYSIOLOGY.
Endogenous Rhythm of the Productivity in Chlorella and the Influence of Light (Endogene Rhythmik der Produktion-Sfahigkeit Bei Chorella und Ihre Beeinflussung Durch Licht),
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GOVERNMENT TOBACCO RESEARCH STATION, FARRUKHABAD (INDIA).
Reaponse of Tobacco (Nicotiana rustica L.) to Brackish Water,
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GRACE (W. R.) AND CO., NEW YORK (ASSIGNEE).
Removal of Phosphate Ion by Flotation with an Anionic Surfactant,
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GREENLANE HOSPITAL, AUCKLAND (NEW ZEALAND). PATHOLOGY DEPT.
A New Reaction for Colorimetric Determination of Carbohydrates,
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GUELPH UNIV. (ONTARIO). DEPT. OF ZOOLOGY.
Benthic Community Metabolism in Bay Quinte and Lake Ontario,
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Associations and Species Diversity in Benthic Macroinvertebrates of Bay of Quinte and Lake Ontario,
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HAMMERMILL PAPER CO., ERIE, PA. PULPING RESEARCH.
Activated Sludge Joint Treatment of Pulp and Paper Effluent with Municipal Sewage,
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HANFORD ENGINEERING DEVELOPMENT LAB. RICHLAND, WASH.
Thermal Effects of Projected Power Growth: Lower Mississippi River Basin,
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HANS RAJ COLL., DELHI (INDIA).
3-Nitroso-4-Hydroxycoumarin as Indicator for the Titration of Iron (III) with Edta,
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Biological Control of Acid Mine Pollution,
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Environmental Aspects of Site Selection,
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HAWAII UNIV., HONOLULU. WATER RESOURCES RESEARCH CENTER.
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HEAT TRANSFER RESEARCH, INC., ALHAMBRA, CALIF.
Predictive Methods for Fouling Behavior,
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HELSINKI UNIV. (FINLAND). DEPT. OF BOTANY.
Distribution and Ecological Features of Hydrophytes in the Polluted Lake Vanajavesi, S. Finland,
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HIGH PLAINS UNDERGROUND WATER CONSERVATION DISTRICT NO. 1, LUBBOCK, TEX.
Ground-Water Basin Management on the High Plains of Texas,
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HOKKAIDO UNIV., SAPPORO (JAPAN). LAB. OF ANALYTICAL CHEMISTRY.
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W73-00302 5A

HONG KONG UNIV. DEPT. OF ZOOLOGY; AND HONG KONG UNIV. RADIOISOTOPE UNIT.
The Occurrence and Toxicity of a Red Tide Caused by Noctiluca scintillans (Macartney) Ehrenb., in the Coastal Waters of Hong Kong,
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HOUSTON UNIV., TEX. DEPT. OF CHEMISTRY.
Direct Isotopic Determination by Atomic Fluorescence Spectrometry,
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HOWARD UNIV., WASHINGTON, D.C. DEPT. OF CIVIL ENGINEERING.
Decay of Peak Concentration in Uniform Flow with Finite Durations of Injection,
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HULL UNIV. (ENGLAND). DEPT. OF GEOGRAPHY.
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Heather Burning and Soil Erosion on the North Yorkshire Moors,
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HYDRAULICS RESEARCH STATION, WALLINGFORD (ENGLAND).
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HYDRO-CLEAR CORP., AVON LAKE, OHIO.
Apparatus and Method of Filtering Solids From A Liquid Effluent,
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HYDROSCIENCE, INC., WESTWOOD, N.J.
The Impact of Oily Material on Activated Sludge Systems.
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Floods Predicted from Rainfall Frequencies,
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ILLINOIS UNIV., CHICAGO.
Convective Diffusion in Cellular Laminar Flow in Tubes,
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ILLINOIS UNIV., URBANA. DEPT. OF CIVIL ENGINEERING.
Analysis and Design of Hyperbolic Cooling Towers,
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IMATRAN VOIMA OSAKEYHTIO, HELSINKI (FINLAND).
Thermal Diffusion of the Warm Water of Power Plants into a Sea Basin,
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IMATRAN VOIMA OSAKEYHTIO, HELSINKI (FINLAND). NUCLEAR POWER PROJECT GROUP.
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Velocity Distribution Far Off Downstream at the Water Surface of a Submerged Jet,
W73-00564 5B

IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON (ENGLAND). DEPT. OF CHEMISTRY.
The Atomic Fluorescence Characteristics and Determination of Chromium in an Argon-Separated Air-Acetylene Flame,
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INSTITUTE OF HYDROLOGY, WALLINGFORD (ENGLAND).
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INSTITUTO NACIONAL DE TECNOLOGIA AGROPECUARIA, CASTELAR (ARGENTINA). CENTRO NACIONAL DE INVESTIGACIONES AGROPECUARIAS.
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Town of Portage Lake, Maine, Preliminary Design Report, Pollution Control Program.
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KIEL UNIV. (WEST GERMANY).
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Aphanizomenon flos-aquae: Infection by Cyanophages,
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LANTBRUKHOGSKOLAN, UPPSALA (SWEDEN). INSTITUTIONEN FOR LANTBRUKETS HYDROTEKNIK.
Precipitation Measurements with Various Precipitation Gauge Installations,
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LAVAL UNIV., QUEBEC.
Relationship Between Stream Water Temperature and Ambient Air Temperature,
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LIVERPOOL UNIV. (ENGLAND). DEPT. OF OCEANOGRAPHY.
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Methods of Approach for Problems of Mixed Convection in Fluid Metals (Methodes d'approche pour les problems de convection mixte dans les metaux liquides),
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LOUISIANA STATE UNIV., BATON ROUGE.
Lipid Geochemistry of a Mississippi Coastal Bog Environment,
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LUND UNIV. (SWEDEN). DEPT. OF PLANT ECOLOGY.
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Microbiology of Scum Formed at the Surface of Lagooned Wastewater,
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MAINE UNIV., ORONO. DEPT. OF MICROBIOLOGY; AND MAINE UNIV., ORONO. DEPT. OF ANIMAL AND VETERINARY SCIENCES.
Preliminary Report: A System for Typing Salmonella Thompson,
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MAINE UNIV., ORONO. DEPT. OF OCEANOGRAPHY; AND MAINE UNIV., ORONO. DEPT. OF ZOOLOGY.
Influence of Environmental Parameters on Intraspecific Variation in Fucus Vesiculosus,
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MAIZE RESEARCH INST., KNEZHA (BULGARIA).
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MANCHESTER UNIV. (ENGLAND). DEPT. OF BOTANY.
Desiccation Injury in Mosses: I. Intraspecific Differences in the Effect of Moisture Stress on Photosynthesis,
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MANITOBA UNIV., WINNIPEG. DEPT. OF MICROBIOLOGY.
Biodegradation of Trisodium Nitrilotriacetate in a Model Aerated Sewage Lagoon,
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MARINE BIOLOGICAL LAB., WOODS HOLE, MASS.
Density-Gradient Centrifugation as an Aid to Sorting Planktonic Organisms. I. Gradient Materials,
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MARYLAND DEPT. OF CHESAPEAKE BAY AFFAIRS, ANNAPOLIS.
Use of Remote Sensing in Shoreline and Near-Shore Management,
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MICHIGAN STATE UNIV., EAST LANSING. PESTICIDE RESEARCH CENTER.
Biologically Active Compounds in the Aquatic Environment: The Effect of DDE on the Egg Viability of Chironomus Tentans,
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MINISTRY OF AGRICULTURE, CAIRO (EGYPT). SOILS DEPT.
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MINNESOTA UNIV., MINNEAPOLIS; JAMES COOK UNIV. OF NORTH QUEENSLAND, TOWNSVILLE (AUSTRALIA); AND BOCHUM UNIV. (WEST GERMANY).
The Controlled Failure of Rock Discs and Rings Loaded in Diametral Compression,
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MINNESOTA UNIV., MINNEAPOLIS. WATER RESOURCES RESEARCH CENTER.
Eighth Annual Report Water Resources Research Center.
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MINNESOTA UNIV., ST. ANTHONY FALLS HYDRAULIC.
Dilution of Buoyant Two-Dimensional Surface Discharges,
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MISSOURI AGRICULTURAL EXPERIMENT STATION, COLUMBIA.
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Pepsin Digestibility Method for Animal Proteins. 1971 Collaborative Study,
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Reservoir Construction on Lowland Rivers of the USSR (O sozdanii vodokhranilishch na ravninnykh rekakh SSSR),
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Effect of Major Dam and Reservoir Construction on Geomorphological Processes in River Valleys,
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Localization of Oxidation of n-Paraffins by Yeasts,
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MOSKOVSKII INZHENERNO-STROITELNYI INSTITUT (USSR).
Current with Transport of Solids; The Determination of the Relationship Between its Integral Parameters and its Point Kinematic Characteristics (Courant Avec Transport Solide: Determination Du Rapport Entre Ses Parametres Integraux Et Ses Caracteristiques Cinematiques Ponctuelles),
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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, GREENBELT, MD. GODDARD SPACE FLIGHT CENTER.
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NATIONAL SWEDISH ENVIRONMENT PROTECTION BOARD, STOCKHOLM.
Contaminants in Pentachlorophenol: Chlorinated Dioxins and Predioxins (Chlorinated Hydroxy-Diphenylethers),
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NAUCHNO-ISSLEDOVATELSKII INSTITUT PRIRODNYKH GAZOV, KHARKOV (USSR).
Barium and Strontium in Groundwaters of Mesozoic-Cenozoic Sedimentary Deposits in the Crimean Steppe Zone (Rasprostraneniye bariya i strontsiya v podzemnykh vodakh mezokaynozoyskikh otlozheniy Stepnogo Kryma),
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State Construction Grant Program, Sewage Treatment Facilities in New Mexico, 1971.
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NEW MEXICO STATE UNIV., UNIVERSITY PARK. WATER RESOURCES RESEARCH INST.
Cloud Chamber Study of Water Evaporation,
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NEWCASTLE COUNTY DEPT. OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL, DOVER, DEL.
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NORTHEAST LOUISIANA UNIV., MONROE, DEPT. OF BIOLOGY.
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Water Quality Management for Metropolitan Washington: The Northern Virginia Plan.
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NORTHWESTERN UNIV., EVANSTON, ILL. DEPT. OF CIVIL ENGINEERING.
Modification of Technique for Determination of Aluminum in Water by Atomic Absorption Spectrophotometry,
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NORTHWESTERN UNIV., EVANSTON, ILL. DEPT. OF GEOLOGICAL SCIENCES.
Water Chemistry of the Amazon River,
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NORWEGIAN INST. FOR WATER RESEARCH, OSLO.
The Importance of Algal Cultures for the Assessment of the Eutrophication of the Oslofjord,
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NOTRE DAME COLL., BELMONT, CALIF. DEPT. OF BIOLOGY.
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OKLAHOMA STATE UNIV., STILLWATER. DEPT. OF BIOCHEMISTRY.
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OKLAHOMA WATER RESOURCES RESEARCH INST., STILLWATER.
Water Reclamation for Ground Water Recharge,
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ONTARIO RESEARCH FOUNDATION, SHERIDAN PARK.
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OREGON STATE UNIV., CORVALLIS. DEPT. OF FOOD SCIENCE AND TECHNOLOGY.
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Essential Fatty Acids in the Diet of Rainbow Trout (Salmo Gairdneri): Physiological Symptoms of EFA Deficiency,
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OREGON STATE UNIV., CORVALLIS. DEPT. OF OCEANOGRAPHY.
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PACIFIC GAS AND ELECTRIC CO., EMERYVILLE, CALIF.
Evaluating Water Surface Heat Exchange Coefficients,
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PACIFIC GAS AND ELECTRIC CO., SAN FRANCISCO, CALIF.
The Geysers Geothermal Power Plant,
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The Use of Resistivity Techniques to Delineate Acid Mine Drainage in Ground Water,
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PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF MICROBIOLOGY.
Soil Enrichment for the Isolation of Sporangial Subgroup II Bacillus Species, and Observations Concerning a Coil-Forming Member of this Group,
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PENNSYLVANIA STATE UNIV., UNIVERSITY PARK. DEPT. OF SOIL PHYSICS.
New Approaches for Pollution Control,
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PENNSYLVANIA WATER AND GAS CO., SCRANTON.
Recovery of Gram Negative Bacteria with Hektoen Agar,
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Evaluating Summer Rainfall Through A Multilayered Largetooth Aspen Community,
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PHILLIPS PETROLEUM CO., BARTLESVILLE, OKLA. RESEARCH DIV.
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Laboratory Investigation on Heat Transfer in Thermally Stratified Flow,
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POLISH ACADEMY OF SCIENCES, KRAKOW. ZAKLAD BIOLOGII WOD.
The Variability of Copper, Zinc, and Manganese Content in the Water of Some Rivers, Streams, and Carp Ponds,
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POTOMAC ELECTRIC POWER CO., WASHINGTON, D. C.
Thermal Pollution and the Power Industry,
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PROCTER AND GAMBLE CO., CINCINNATI, OHIO. WINTON HILL TECHNICAL CENTER.
Salmonella Testing of Pooled Pre-Enrichment Broth Cultures for Screening Multiple Food Samples,
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PURDUE UNIV., LAFAYETTE, IND. SCHOOL OF CIVIL ENGINEERING.
Turbulence Characteristics of Overland Flow,
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QUEENSLAND AGRICULTURAL COLL., LAWES (AUSTRALIA).
Long-Term Effects of Saline Irrigation Water on Saturation Extract Determination of a Clay Soil in the Lockyer Valley, Queensland,
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READING UNIV. (ENGLAND). DEPT. OF ZOOLOGY.
Primary Production and Respiration of the Phytoplankton of the Rivers Thames and Kennet at Reading,
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RHODE ISLAND STATEWIDE PLANNING PROGRAM, PROVIDENCE.
Program Prospectus for the Coastal Resources Management Council.
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RIJKSINSTITUUT VOOR DE VOLKSGEZONDHEID, BILTHOVEN (NETHERLANDS).
New Technique for Biotyping,
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RIJKSWATERSTAAT-DELTADIENST, THE HAGUE (NETHERLANDS).
The Netherlands Deltaproject: Its Environmental Impact,
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ROME UNIV. (ITALY). INSTITUTO DI FARMACOLOGIA E FARMACOGNOSIA.
Activity Studies of Charged and Uncharged Molecules Using Detergent Gel Membrane Systems,
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Inventory of Estuarine Site Development Lagoon Systems: New Jersey Shore,
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RUTGERS-THE STATE UNIV., NEWARK, N.J. COLL. OF ARTS AND SCIENCES.
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S. V. REGIONAL COLL. OF ENGINEERING AND TECHNOLOGY, SURAT (INDIA). DEPT. OF MATHEMATICS.
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SAN ANTONIO CITY PUBLIC SERVICE BOARD, TEX.
Maximum Utilization of Calaveras Cooling Lake for Electric Generation,
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SANKYO CO. LTD., TOKYO (JAPAN). RESEARCH LAB.
Variation of BOD Removal and its Control in a Large Scale Plant Using the Activated Sludge Process, (In Japanese),
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A. Centers of Competence		
Battelle Memorial Institute, Methods for Chemical and Biological Identification of Pollutants	W73-00272 – 00297 00299 – 00313 00330 – 00338 00340 – 00344 00346 – 00371 00373 – 00374 00376 – 00377 00379 – 00384 00386 – 00398 00400 – 00447	152
Bureau of Reclamation, Engineering Works	W73-00316 – 00317 00319 – 00320 00322 – 00326 00328 – 00329	11
Cornell University, Policy Models for Water Resources Systems	W73-00089 – 00100 00636 – 00640	17
University of Florida, Eastern U. S. Water Law	W73-00040 – 00061 00462 – 00479 00481 – 00490 00492 – 00498 00500 00502 – 00512	69
University of Texas, Wastewater Treatment and Management	W73-00155 – 00159 00161 – 00170 00172 – 00173 00177 – 00186	27
University of Washington, Water Quality Requirements for Aquatic Organisms	W73-00001 – 00009 00011	10
University of Wisconsin, Eutrophication	W73-00231 – 00239 00241 – 00258	27
U. S. Geological Survey, Hydrology	W73-00013 – 00039 00101 – 00138 00143 – 00144 00187 – 00190 00192 – 00207 00545 – 00588 00590 – 00599	141
Vanderbilt University, Thermal Pollution	W73-00067 – 00069 00071 – 00080 00082 00084 – 00085 00087 – 00088 00208 – 00209 00211 – 00213 00220 00222 – 00225 00227 – 00230	36

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B. State Water Resources Research Institutes		
California Water Resources Institutes	W73-00268	1
Colorado Environmental Resources Center	W73-00139 -- 00140	2
Connecticut Institute of Water Resources	W73-00271	1
Michigan Institute of Water Research	W73-00270	1
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Texas Water Resources Institute	W73-00544	1
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C. Other		
BioSciences Information Service	W73-00010, 00012 00062 -- 00064 00070, 00081 00083, 00086 00141, 00160 00171 00174 -- 00176 00191, 00210 00214, 00219 00221, 00226 00240, 00259 00298, 00315 00318, 00321 00327, 00039 00345, 00372 00375, 00378 00385, 00399 00480, 00491 00499, 00501 00589, 00604 00607 -- 00635 00641 -- 00650	80
Engineering Aspects of Urban Water Resources (Poertner)	W73-00448 -- 00461	14
Environmental Protection Agency	W73-00065 -- 00066	2
Ocean Engineering Information Service	W73-00513 -- 00542	30
Office of Saline Water	W73-00600 -- 00603 00605 -- 00606	6
Office of Water Resources Research	W73-00145 -- 00154 00260 -- 00262	13

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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Water Resources Division of the U. S. Geological Survey, U. S. Department of the Interior.
- Metropolitan water resources management at the Center for Urban Studies of the University of Chicago.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Design and construction of hydraulic structures; weather modification; and evaporation control at the Bureau of Reclamation. Denver, Colorado.
- Eutrophication at the Water Resources Center of the University of Wisconsin, jointly sponsored by the Soap and Detergent Association and the Agricultural Research Service.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Public water supply treatment technology at the American Water Works Association.

Supported by the Environmental Protection Agency in cooperation with WRSIC.

- Thermal pollution at the Department of Sanitary and Water Resources Engineering of Vanderbilt University.
- Water quality requirements for freshwater and marine organisms at the College of Fisheries of the University of Washington.
- Wastewater treatment and management at the Center for Research in Water Resources of the University of Texas.
- Agricultural livestock wastes at the Department of Agricultural Engineering of Iowa State University.
- Methods for chemical and biological identification and measurement of pollutants at the Analytical Quality Control Laboratory of the Environmental Protection Agenc
- Coastal pollution at the Oceanic Research Institute.
- Water treatment plant waste pollution control at American Water Works Association.
- Effect on water quality of irrigation return flows, at the Department of Agricultural Engineering of Colorado State University.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

6 WATER RESOURCES PLANNING

7 RESOURCES DATA

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